FINAL

PHASE II PROPERTY ASSESSMENT REPORT
AIR FORCE PLANT 85
COLUMBUS, OHIO

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PREFACE

This *Phase II Property Assessment Report* was written by Earth Tech to describe the results of the investigation of 34 individual areas at Air Force Plant 85. This report was developed in accordance with guidelines set forth in the Ohio Environmental Protection Agency (OEPA) VAP Rules (Ohio Administrative Code 3745-300), and the Air Force Center for Environmental Excellence (AFCEE) *Handbook for the Installation Restoration Program (IRP) Remedial Investigations and Feasibility Studies (RI/FS)* (United States Air Force, 1993). All work was completed under ASC Contract No. F33601-96-D-W019, Delivery Order No. 5015.

The objectives of the investigation were to:

1. Verify the presence or absence of suspected contaminants in the concrete surfaces in and around two sites, previously used for various industrial processes.

2. Verify the presence or absence of suspected contaminants in the subsurface soils in and around 32 sites, including septic tanks, sewers, former UST sites, and locations of industrial processes.

Field activities included concrete chip and wipe sampling, soil sampling, and groundwater sampling.

Due to the iterative and repetitive nature of the VAP, this report and the investigation on which it is based may neither meet all the requirements for a Phase II Property Assessment in accordance with OAC 3745-300-07 nor provide adequate basis for a No Further Action Letter in accordance with OAC 3745-300-13. It should be noted, however, that the investigation and report satisfy, or aid in satisfying, the Air Force's environmental restoration requirements under Public Law 100-456. To meet these unique requirements, the Air Force intends to utilize potentially applicable or relevant and appropriate requirements, in particular the VAP Rules, to the extent possible and necessary. Compliance with all the requirements of the VAP Rules may not be necessary under Public Law 100-456 and is not intended by this report.

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List of Acronyms and Abbreviations

AFCEE	Air Force Center for Environmental Excellence
AFP85	Air Force Plant 85
ASC	Aeronautical Systems Center
ASTM	American Society for Testing and Materials
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
cm^2	Square centimeters
cm/s	Centimeters per second
COC	Chemicals of Concern
DERR	Division of Emergency and Remedial Response
DFAS	Defense Finance Accounting Service
DOT	Department of Transportation
DQO	Data Quality Objective
DRO	Diesel Range Organics
EBS	Environmental Baseline Survey
ECD	Electron Capture Detector
EM	Electromagnetics
ERPIMS	Environmental Restoration Program Information Management System
FACNO	Facility Number
FID	Flame-ionization Detector
gpm	gallons per minute
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometer
GOCO	Government-Owned, Contractor-Operated
GPR	Ground-penetrating Radar
GPS	Global Positioning System
GRO	Gasoline Range Organics
HCl	Hydrochloric Acid
ID	Inner Diameter
IRP	Installation Restoration Program
IRPIMS	Installation Restoration Program Information Management System
IWTP	Industrial Wastewater Treatment Plant
LCS	Laboratory Control Sample
LLC	Limited Liabilities Corporation
MAG	Magnetics
MCL	Maximum Contaminant Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
NIRAP	Naval Industrial Reserve Aircraft Plant
NIST	National Institute of Standards and Technology
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl

List of Acronyms and Abbreviations

PHC	Petroleum Hydrocarbons
PID	Photoionization Detector
ppm	Parts per million
PRG	Preliminary Remediation Goal
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative Percent Difference
SOP	Standard Operating Procedure
SOW	Statement of Work
SVOC	Semivolatile Organic Compound
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
TCLP	Toxic Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TOX	Total Organic Halogens
TPH	Total Petroleum Hydrocarbon
TSCA	Toxic Substances Control Act
$\mu g/100\ cm^2$	Micrograms per 100 square centimeters
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VAP	Voluntary Action Program
VOC	Volatile Organic Compound
WV	Well Volume

1.0 INTRODUCTION

1.1 BACKGROUND

This document is the Phase II Property Assessment Report for Air Force Plant 85 (AFP85) in Columbus, Ohio. This report provides analysis and interpretation of information gathered during the course of the investigation of 34 individual facility numbers (FACNOs) identified during the Phase I Property Assessment. The FACNOs, or sites, are being investigated because contaminant releases to the environment are suspected as a result of previous industrial processes.

In general, the Phase I Property Assessment was intended to (1) report on the environmental history of the property, (2) identify properties ineligible for participation in the Ohio VAP as prescribed in OAC 3745-300-02, and (3) identify areas requiring investigation or remediation during the Phase II stage.

A Phase II Property Assessment Statement of Work (Phase II SOW) (Reference 308) was prepared for the U.S. Air Force (USAF) Aeronautical Systems Center (ASC) to scope the investigative and remediation work to be conducted during the Phase II Property Assessment at AFP85. The Phase II Property Assessment is being performed at various locations due to suspected contaminant releases to the environment. In general, the Phase II SOW was intended to (1) provide a summary of the Phase I Property Assessment findings, (2) provide a description of the data collection activities planned to be conducted during the Phase II Property Assessment, and (3) provide a general estimation of the time frame for completing the activities. The first investigation (Phase II-Fall 98) was conducted August-September 1998. During that field effort, 19 sites were investigated.

Both a Phase I Property Assessment in accordance with OAC 3745-300-06 and a Phase II SOW in accordance with OAC 3745-300-07 are required for a volunteer to demonstrate sufficient evidence of entry in the Ohio Voluntary Action Program (VAP), Ohio's Brownfields initiative aimed at redevelopment of former industrial sites.

The second field investigation (Phase II-Winter 99) for the Phase II Property Assessment was conducted in Winter 1999. This investigation consisted of data collection activities at 34 sites identified in the Phase II SOW. The 34 sites selected for investigation during Phase II-Winter 99 were selected based on a prioritization of all the sites requiring Phase II investigation activities. These sites are listed in Section 4.0. The scope of this effort was contracted by ASC under contract number F33601-96-D-W019, task order number 5015.

The objectives of the Phase II Property Assessment investigation were to:

1. Verify the presence or absence of suspected contaminants in the concrete surfaces in and around two sites, previously used for various industrial processes.

2. Verify the presence or absence of suspected contaminants in the subsurface soils in the vicinity of 32 sites, including septic tanks, sanitary and process sewers, underground storage tanks (USTs), and locations of industrial processes.

1.2 PURPOSE OF THE REPORT

This report has been prepared in accordance with guidelines set forth in the OAC 3745-300, the Ohio VAP Rule. This report also follows the format and content requirements of the *Handbook for the Installation Restoration Program (IRP) Remedial Investigations and Feasibility Studies (RI/FS)* (hereinafter referred to as the *IRP Handbook*) (USAF, 1993).

This Phase II Property Assessment Report contains five sections. Section 1 provides a description of the Ohio VAP, information on the past operations at AFP85, and the location and environmental setting of AFP85. Section 2 provides a description of the applicable standards for various environmental media, as well as the background data collected during the Phase II-Fall 98 field effort. Section 3 provides descriptions of the procedures used for the various investigative methods. Section 4 provides results of the Phase II-Winter 99 effort for individual sites, including site background, field activities conducted, identification of contaminants and recommendations for further investigation or remediation. Lastly, Section 5 provides results of waste characterization sampling, and presents the classification of each drum of waste for off-site disposal.

1.3 SITE LOCATION

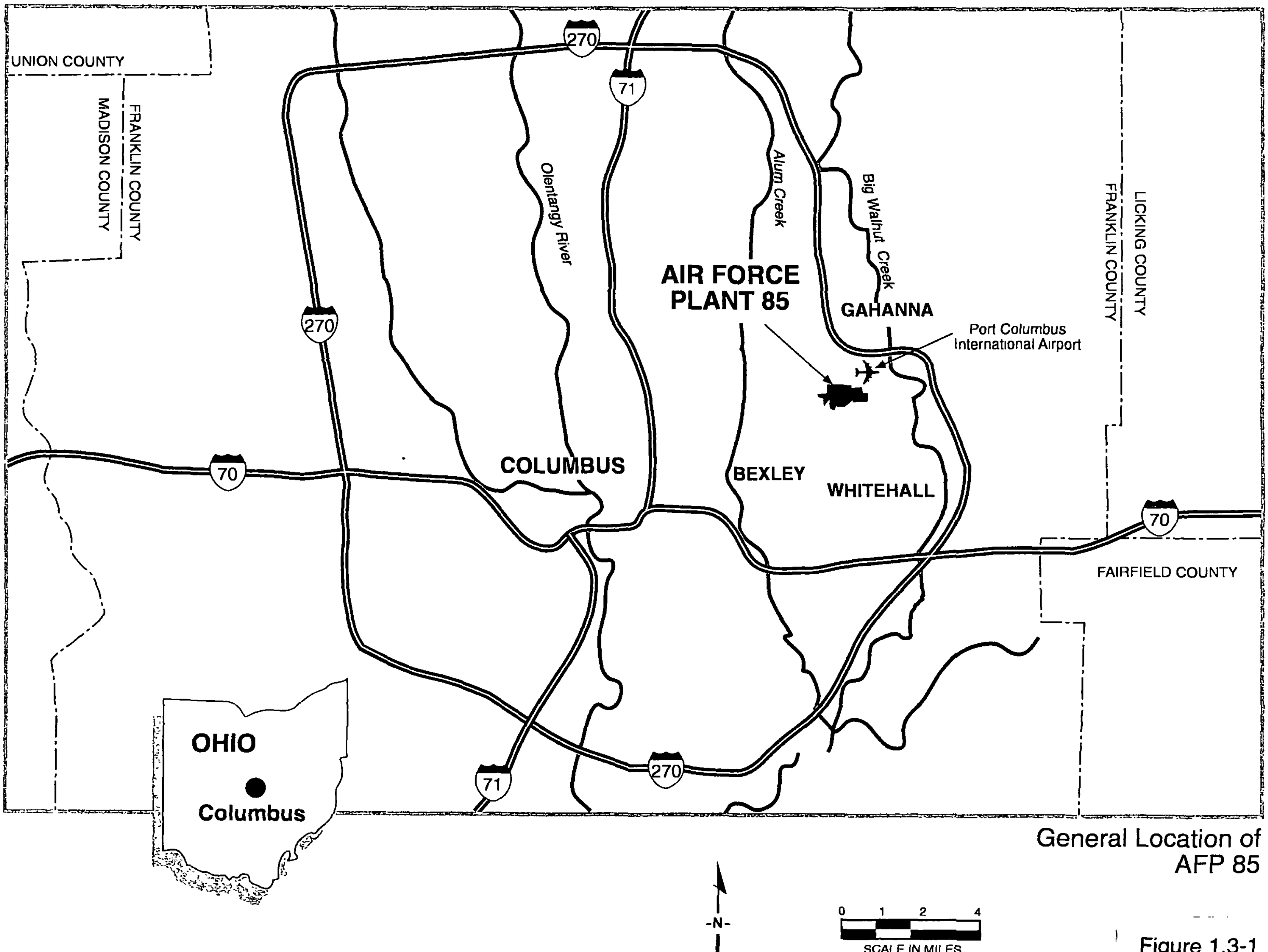
AFP85 is located in Franklin County, Ohio in the eastern portion of the City of Columbus. The facility is located at 4300 East Fifth Avenue, directly south of the Port Columbus International Airport and approximately 6 miles east-northeast of downtown Columbus. The location is shown on Figure 1.3-1.

AFP85 is a government-owned, contractor-operated (GOCO) facility that was operated and maintained by two government contractors: Rockwell International and McDonnell Douglas. AFP85 consists of two noncontiguous parcels that encompass approximately 420 acres: the main industrial manufacturing parcel consisting of approximately 270 acres located north of East Fifth Avenue, and an undeveloped parcel consisting of approximately 150 acres located west of Steltzer Road. Figure 1.3-2 shows the location of parcels that constitute the AFP85 real property. Parcel 6 in Figure 1.3-2 is the 150-acre undeveloped parcel.

Of the 420 acres of USAF-owned property, 55.82 acres is perpetual easement to the City of Columbus. The U.S. Department of Transportation (DOT), Federal Aviation Administration has a use agreement with the City of Columbus dated 20 September 1975 for use of this easement. In addition, 21 acres of AFP85 is easement to the State of Ohio, DOT.

1.4 PRIOR FACILITY OPERATIONS

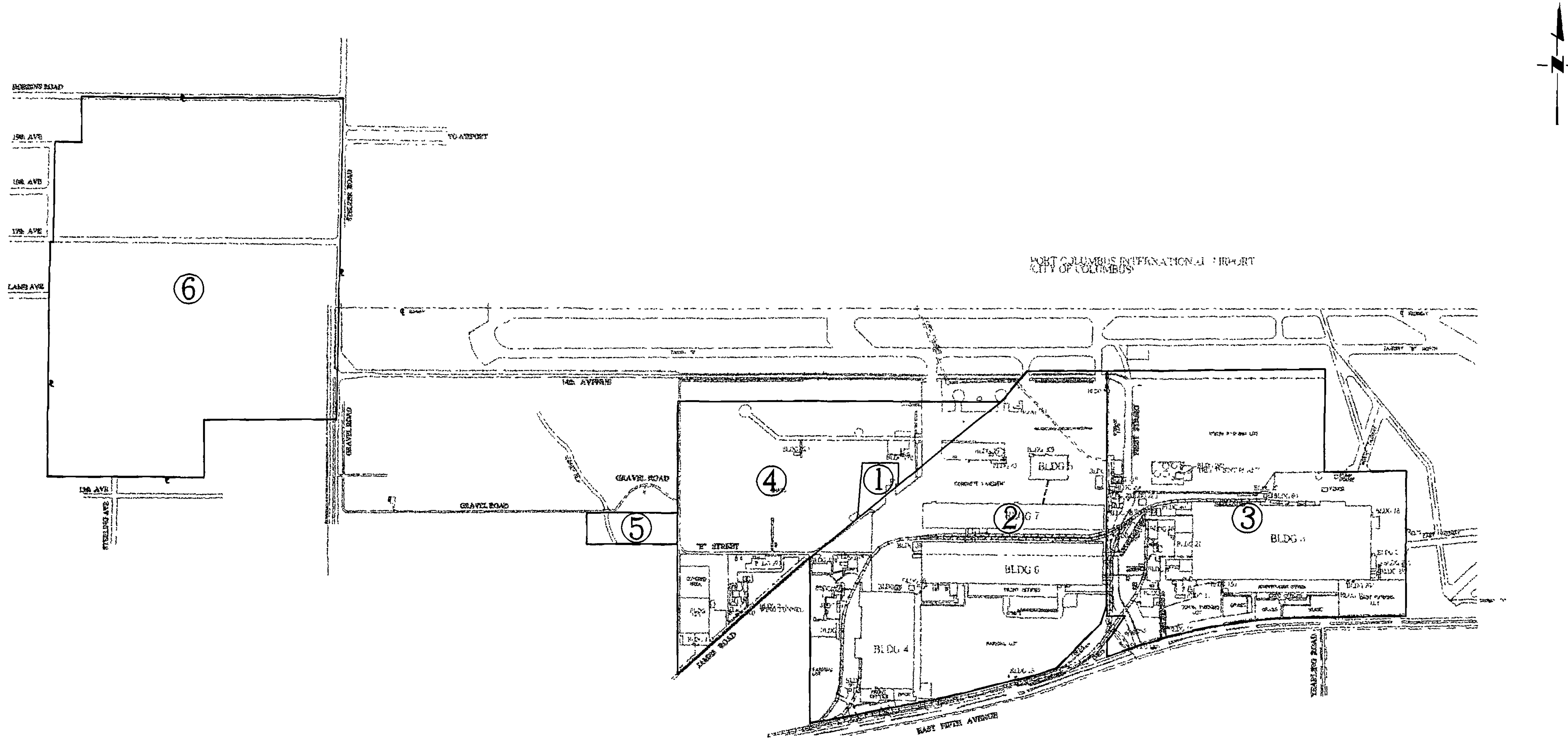
Construction of AFP85 began in 1940 with the building of Plant Number 3 by PLANCOR, the Defense Plant Corporation, a subsidiary of the Reconstruction Finance Corporation. The Plant was constructed to produce naval aircraft during World War II and was operated by the Curtiss Wright Corporation (Curtiss-Wright). Aircraft produced at the Plant included the SO3C Naval Scout Observation plane and the SB2C Naval fighter. A total of 800 SO3Cs were accepted for service and approximately 3,500 SB2Cs were produced at the Plant. At the end of World War II, the SB2C-5 and the XBT2C experimental torpedo bomber were produced. Curtiss-Wright employed over 24,000 people at AFP85 during World War II (Reference 52).



General Location of
AFP 85

Figure 1.3-1

GF/AFP 85/0789



SOURCE: O'Brien & Gere Engineers, Inc., *Environmental Baseline Survey "PARCEL SUMMARY MAP"*, File No. 1549.017-14F, November 1994

F5.DWG/F14.PLT (XREF: XREF-3.DWG, F14.DWG) 12/97

PARCEL	CURRENT OWNER
1	UNITED STATES
2	UNITED STATES
3	UNITED STATES
4	UNITED STATES
5	UNITED STATES
6	UNITED STATES

— — — PLANT BOUNDARY

450 225 0 450 900 1350 1800

SCALE IN FEET

AIR FORCE PLANT 85
Columbus, Ohio
Parcel Summary Map

EARTH TECH

Figure 1.3-2

After World War II, three experimental aircraft models, the XBT2C, XSC-2, and XP-87, were produced at the Plant. After 1946, C-46 and B-29 aircraft were overhauled under contract. In November 1950, due to the substantial decline in aircraft production, Curtiss-Wright discontinued operations at the Plant (Reference 52).

In 1950, the U.S. Navy took title of Building 3, the original Plant Number 3, from PLANCOR. The Plant became the Naval Industrial Reserve Aircraft Plant (NIRAP). Buildings 6 and 7, then referred to as Buildings 3A and 3B, were leased to the Lustron Corporation, a manufacturer of pre-fabricated houses. Lustron later declared bankruptcy, and these buildings were requisitioned by the Navy and incorporated into the NIRAP in April 1951 (Reference 52).

North American Aviation (North American) began producing aircraft at the NIRAP in November 1950. Aircraft produced included the F-86 Sabre Jets, T-66 Texan Trainers, AJ-2 Navy Bombers, and FJ Series Fury Jets. In addition, North American obtained the B-29 contract from Curtiss-Wright. Production began on the F100 Super Sabers in 1955 and T-28 Trojans in 1956. In 1956, North American began the development of the T-25 Buckeye and the A3-J Vigilante. A missile project group was also established at the NIRAP in 1956 (Reference 52).

During the 1960s, North American continued to produce Naval aircraft such as the T-2, T-2B, T-2C, A-5, RA-5C, XAT-28E, and OV-10A. The missile division was involved in the development of the Redhead/Roadrunner for the Army, the Hornet for the USAF, and the Condor for the Navy. The thermodynamics laboratory (Building 271) and the transonic-supersonic wind tunnel (Building 210) were constructed during this decade (Reference 52).

North American continued aircraft production during the 1970s but at a substantially lower rate. Ongoing development programs included the Condor Missile, the YOD-10D, the B-1 Bomber, the Navy V/STOL (XFV-12A), the Army Hellfire, and the USAF GBU-15. Production in the early and mid-70s included the RA-5C, the B-1B Bomber, the Space Shuttle, the OV-10, and the T-2K (Reference 52).

In 1973, North American was purchased by Rockwell International. Due to the cancellation of several military programs at the end of the 1970s, AFP85 operations were limited to the Army Hellfire missile and production work supporting military and commercial contracts. By 1979, Rockwell International employed only 2,000 workers at AFP85 (Reference 52).

Aircraft production during the 1980s included components for the B1-B Bomber aircraft, the MX-Peacekeeper Missile, and the Space Shuttle. In 1982, the Navy transferred the NIRAP to the USAF. At that time the Plant was designated as AFP85. In 1988, McDonnell Douglas took over operation of AFP85 from Rockwell International. Operations at the facility included the production of parts for the F-15 and C-17 aircraft. Production ceased in early 1994, and McDonnell Douglas completely vacated the Plant by January 1995 (References 68, 154).

1.5 ENVIRONMENTAL SETTING

The geologic sequence beneath Franklin County consists of sedimentary bedrock units dating from the early Devonian to early Mississippian overlain by glacial deposits, alluvium, and soil. The bedrock consists of beds of dolomitic limestone, black shale, and alternating shale and sandstone (Reference 52). The surface soils present at the site consist of yellowish brown and gray, silty clay loam. (Reference 213).

Two aquifer systems are present at AFP85: Devonian limestone aquifers and glacial outwash aquifers. The Devonian aquifers, which supply approximately a third of all groundwater in Franklin County, can yield groundwater at a rate up to 400 gallons per minute (gpm). The glacial outwash aquifers can yield up to 200 gpm (Reference 213).

AFP85 is located in an area of temperate continental climate and changeable weather conditions. These weather conditions are influenced by air masses from all directions, including those from central and northwest Canada, occasional cool outbreaks from the Hudson Bay Region during the spring, and tropical Gulf masses from the Atlantic in the summer. The average precipitation is approximately 37 inches per year, and the average annual snowfall is approximately 28 inches per year. Thunderstorms occur on an average of 42 days each year, mostly in the summer (Reference 52).

AFP85 is located in the Big Walnut Creek drainage basin. Surface water runoff from AFP85 discharges to Turkey Run, located in the western portion of the AFP85 property, and into Mason's Run, located in the central portion of the AFP85 property. These two streams eventually join together south of the facility and enter Big Walnut Creek approximately 5 miles south of the Plant (Reference 86).

Mason's Run is channeled in a concrete culvert through most of its extent within the Plant boundaries. It drains from the Port Columbus International Airport, flows underground southward through the facility, and reemerges and exits the Plant under Fifth Avenue. Turkey Run is an intermittent stream that crosses the westernmost segment of the Plant after passing through Port Columbus International Airport. Approximately 375 feet of Turkey Run traverses the Plant property. An extensive on-site stormwater drainage system has been constructed throughout the Plant property and drains into Mason's Run in the central part of the Plant, whereas some stormwater from the western part of the Plant drains into Turkey Run.

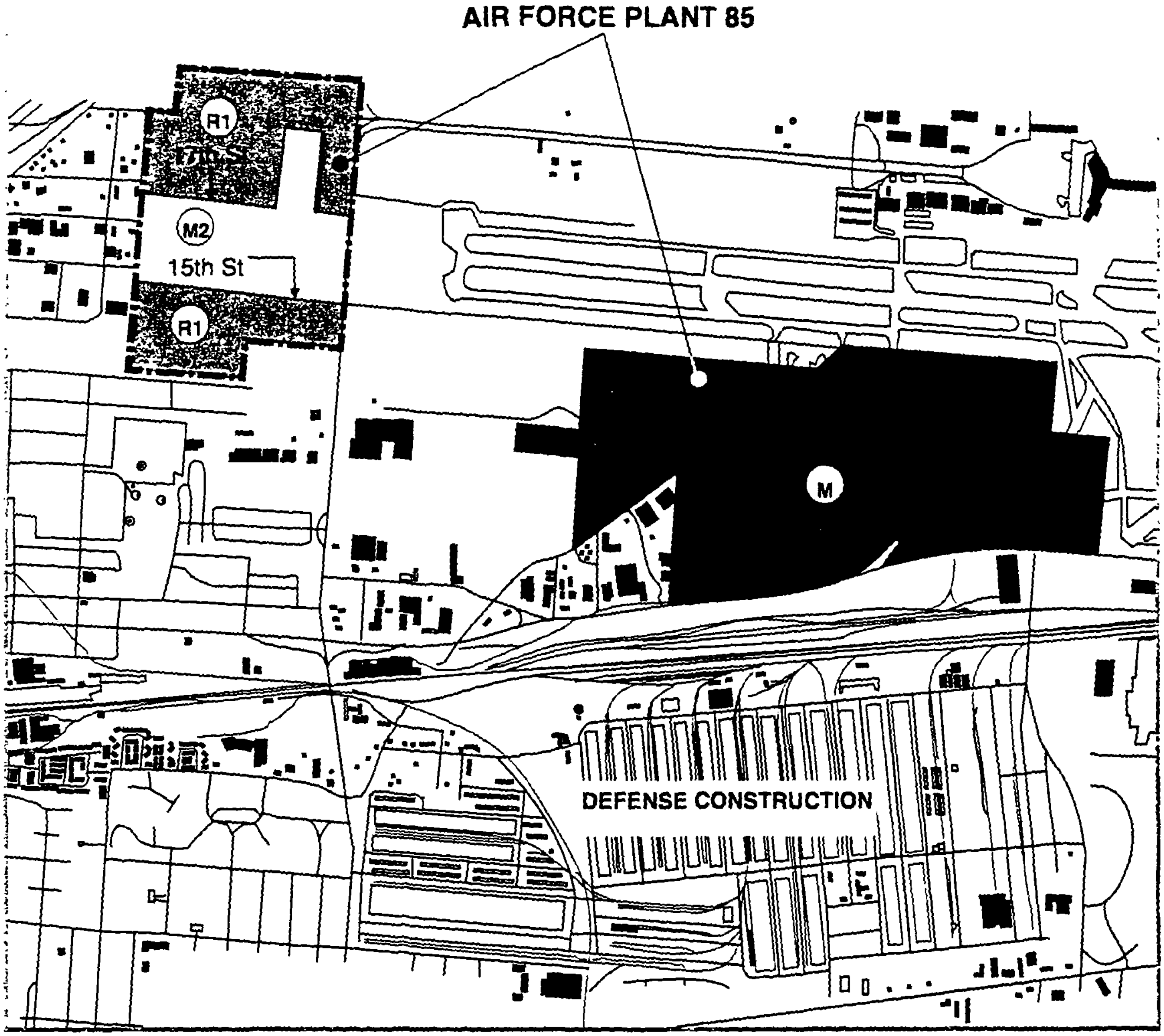
1.6 CURRENT AND INTENDED USES OF AFP85

All production activities at the Plant ended in March 1994. Defense Finance Accounting Service (DFAS) currently occupies office space in Buildings 3 and 6, while Schottenstein, Inc. is using Buildings 3 and 4 for warehousing purposes.

The USAF plans to divest AFP85 through two separate types of transfers. The portion of the property that is contiguous to the Port Columbus International Airport (the northern portion of the main industrial parcel) is intended to be transferred to the Columbus Port Authority for airport use. The undeveloped parcel located west of Steltzer Road is currently zoned as a manufacturing (M) and residential (R1) district and will also be transferred to the Port Authority. These two parcels will be transferred in the same deed on which the USAF plans to place restrictions for industrial uses only. Figure 1.6-1 shows the zoning at AFP85.

The remainder of the main parcel (the southern portion), which contains the majority of the structures, has been transferred to 4300 East Fifth Avenue Limited Liabilities Corporation (LLC). The main parcel is currently zoned by the City of Columbus as a manufacturing district.

According to the current zoning maps, uses can include general industrial and commercial activities. However, as a part of the property transfer, the USAF placed restrictions on the deed for industrial uses only.



Source: Ref 252

M General Industrial and Commercial

M2 Limited Industrial and Office Only

R1 Residential, Single Family

AFP 85 Boundary

N

0 550 1100 2200

Scale in Feet

Zoning at AFP 85, Columbus, Ohio

Figure 1.6-1

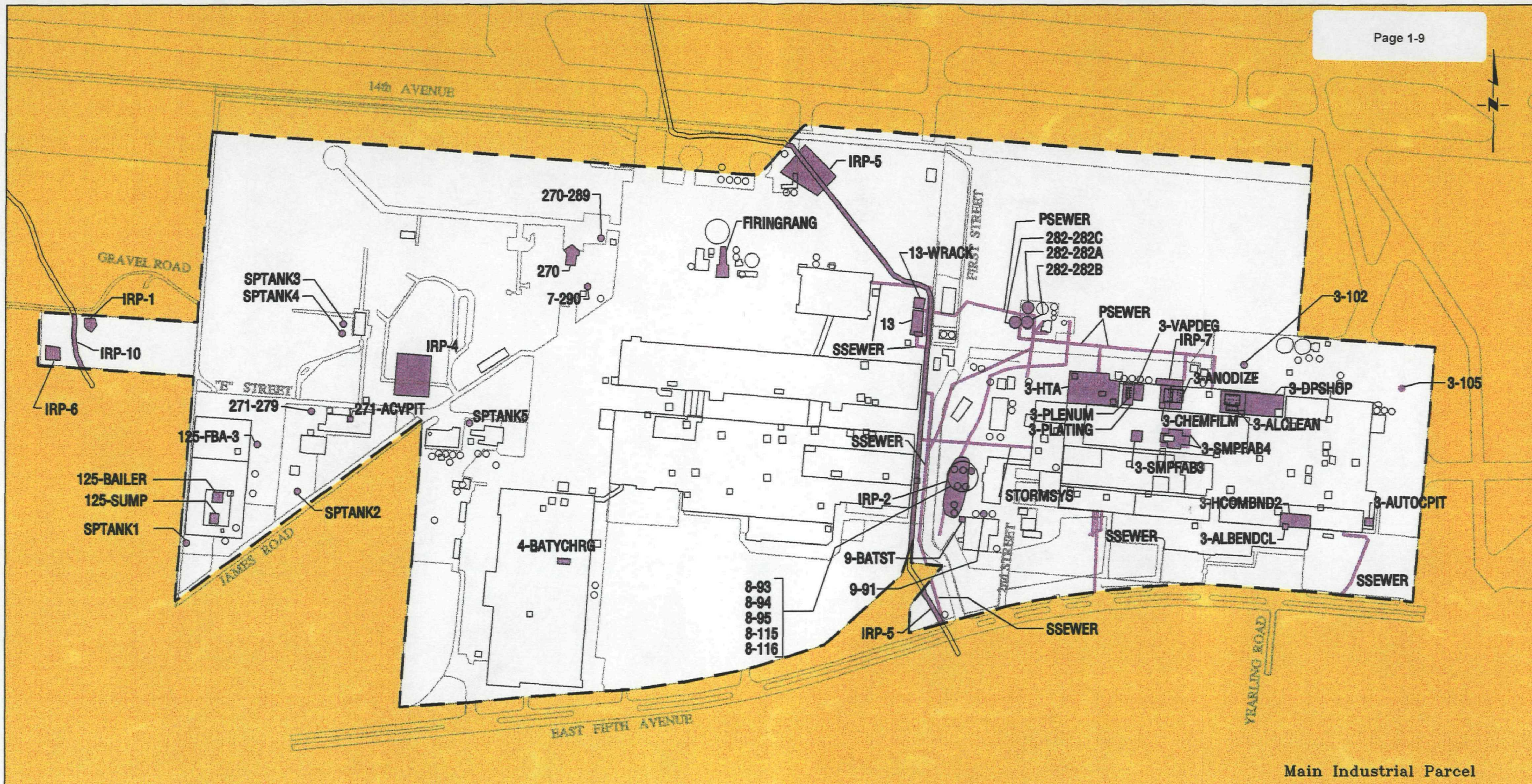
1.7 THE OHIO VAP

The purpose of Ohio's VAP is to encourage redevelopment and reuse of land contaminated by hazardous chemicals and petroleum. To achieve this purpose, the VAP established procedures for qualifying a property. These procedures strike a balance between protection of human health and the environment, cost of cleanup, and ease of use. The procedures, defined in the VAP rules (OAC 3745-300-01 through OAC 3745-300-15), include: the certification of laboratories and professionals; procedures for conducting Phase I and Phase II investigations, risk assessments, and remediations; and variances. The rules also define generic cleanup standards and groundwater classification.

Certified Laboratories and Professionals. Consultants and laboratories that do work under the VAP must be certified by the Ohio Environmental Protection Agency (OEPA). Certified laboratories must verify that they have the capability and quality assurance/quality control (QA/QC) program to meet the laboratory standards required under the VAP. Two laboratories certified by the OEPA have been contracted for analysis of samples collected during Phase II-Winter 99: Quanterra Labs, Canton, Ohio, and Kemron Labs, Marietta, Ohio. Certified professionals must verify that the cleanup was done properly and meets acceptable standards. All certified professionals must have at least 8 years of experience investigating and remediating hazardous substances, and 3 years of experience directly supervising remediation projects.

Phase I Property Assessment. The Phase I VAP rule establishes procedures for evaluation of a property prior to any soil or groundwater testing conducted as part of a voluntary action. The Phase I investigation shapes the course that the Phase II investigation will take. Figure 1.7-1 depicts the VAP-eligible AFP85 sites identified in the Phase I Property Assessment (Reference 267).

Phase II Property Assessment. The Phase II SOW (Reference 308) scopes the investigative and remediation work to be conducted during the Phase II Property Assessment. The AFP85 VAP-eligible sites investigated during the Phase II-Winter 99 effort are shown on Figure 1.7-2.



85-BFRM.DWG/1_6-1.PLT

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VAP-Eligible properties and FACNOs

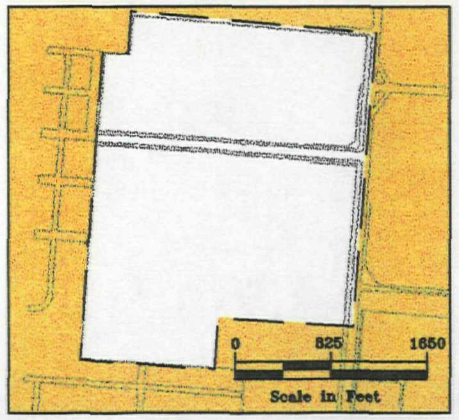
Other plant property

Off-site property

Plant boundary

230 115 0 230 460 690

Scale in Feet

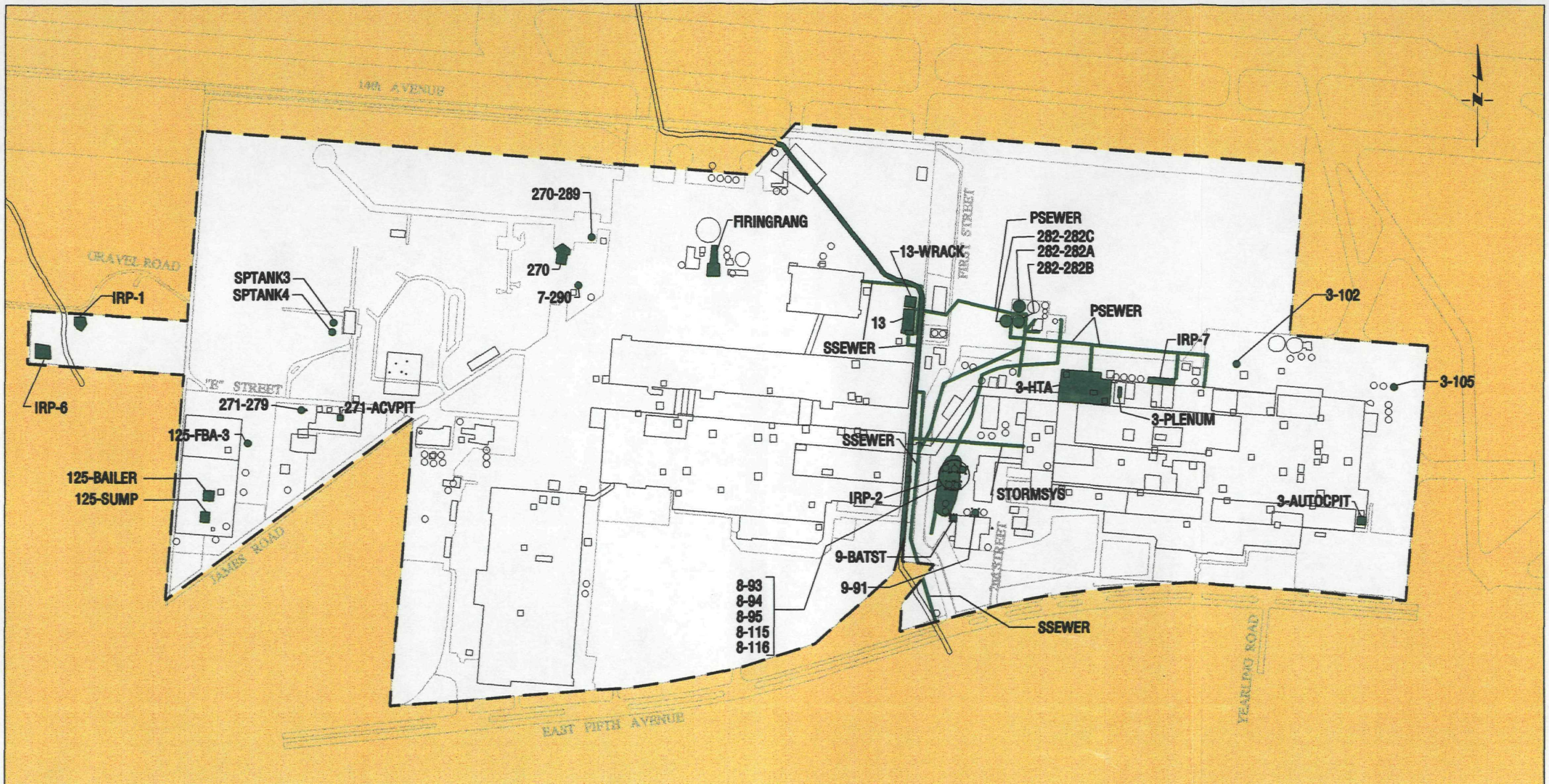


AFP 85 Undeveloped Parcel (West of Steltzer Road)

Ohio VAP-Eligible Properties Requiring Further Investigation AFP 85, Columbus, Ohio

Figure 1.7-1

EARTH TECH



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VAP-Eligible Properties and FACNOs

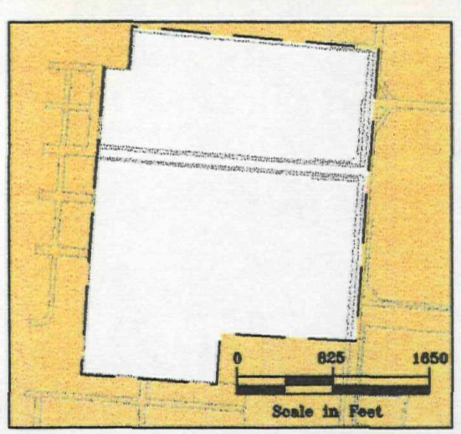
Other plant property

Off-site property

---- Plant boundary

230 115 0 230 690

Scale in Feet



AFP 85 Undeveloped Parcel (West of Steltzer Road)

Ohio VAP-Eligible Sites Investigated, Winter 1999, AFP 85, Columbus, Ohio

Figure 1.7-2

EARTH TECH

2.0 APPLICABLE STANDARDS AND BACKGROUND CONCENTRATIONS

This section presents the standards that apply to the Phase II-Winter 99 Property Assessment analytical data comparison. The Ohio VAP standards for soil and groundwater are provided. Other media being investigated (concrete) do not have VAP generic standards. Concrete data will be compared to background concentrations in Building 3 determined during the Phase II-Fall 98 field investigation. The standards presented in this Phase II Property Assessment Report are for comparison and may or may not be applicable standards. Applicable standards may be developed via site-specific risk assessments, in accordance with OAC 3745-300-09(B)(1). Recommendations for site-specific risk assessments are provided in Section 4. Following review of OAC 3745-300-09(B)(2), mandatory application of risk assessments could be followed where leaching of contaminants to groundwater is possible. This application of the rule will be better defined once the vertical and lateral extent of contamination is determined for each site having concentrations exceeding adjusted VAP standards.

2.1 OHIO VAP STANDARDS

Rule 3745-300-08 defines and establishes generic numerical standards for chemical concentrations in groundwater and soil that ensure protection of public health and the environment. These standards are discussed in greater detail below.

Soil Standards. Risk-based soil standards have been developed on the basis of the intended use of the land (i.e., residential, commercial, or industrial). An individual property may be divided into several parcels, each with a different land use.

Soil standards for chemicals commonly detected in soil are presented under Paragraph (B)(3) of OAC 3745-300-08. These "generic direct contact soil standards" are based on exposure resulting from ingestion of soil, dermal contact with soil, or inhalation of volatile and particulate emissions from soil. Table 2.1-1 presents generic numerical soil standards for chemicals of concern at AFP85, assuming future industrial land use. The direct contact soil standards were developed using the following two restrictions:

- Carcinogenic effects must not exceed one cancer case in a population of 100,000 ($1x10^{-5}$), and
- Noncarcinogenic effects must not exceed a hazard index of 1.

In addition to the risk-based soil standards used for most chemicals, the rule separately addresses total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCBs), and lead. These standards (also presented in Table 2.1-1) consider factors and assumptions in addition to the carcinogenic or noncarcinogenic risk of the other compounds.

The TPH standards apply only to the industrial land use category; commercial and residential sites with high concentrations of TPH must conduct property-specific risk assessments. The rule divides the petroleum fractions into three categories: light fractions (gasoline and gasohol), middle fractions (diesel fuel and kerosene), and heavy fractions (lube oil and hydraulic oil). At industrial properties, the standard for petroleum is based on the type or types of petroleum fractions found on the property and the vertical hydraulic conductivity of the unsaturated soil.

Table 2.1-1
Generic Numerical Soil Standards – Future Industrial Land Use (mg/kg)

Chemical of Concern	Single Chemical Noncarcinogens	Single Chemical Carcinogens	Soil Saturation	Single Chemical Generic Direct Contact Standard*
Inorganic Compounds				
Aluminum	1,000,000	--	--	1,000,000
Antimony	220	--	--	220
Arsenic	610	86	--	86
Barium	140,000	--	--	140,000
Beryllium	10000	30	--	30
Cadmium	300	170,000	--	300
Chromium(III)	63,000	--	--	63,000
Chromium(VI)(1)	2,800	26,000	--	2,800
Cobalt	10,000	--	--	10,000
Copper	70,000	--	--	70,000
Iron	100,000	--	--	100,000
Lead	--	--	--	2,800
Manganese	45,000	--	--	45000
Mercury	230	--	--	230
Nickel (soluble salts)	3,700	--	--	3,700
Selenium	10,000	--	--	10,000
Silver	10,000	--	--	10,000
Thallium	160	--	--	160
Vanadium	14,000	--	--	14,000
Zinc	370,000	--	--	370,000
Volatile Organic Chemicals				
Acetone	56,000	--	100,000	56,000
Benzene	68	75	900	68
Carbon Disulfide	3,300	--	720	720
Carbon Tetrachloride	15	28	990	15
Chloroform(2)	150	0.52	--	0.52
1,1-Dichloroethane	5,400	--	2,300	2,300
1,1-Dichloroethene	5,000	6.30	1,600	6.30
1,2-Dichloroethane	--	41	2,900	41
cis-1,2-Dichloroethene	5,500	--	1,200	1,200
trans-1,2-Dichloroethene	11,000	--	2,500	2,500
Ethylbenzene	13,000	--	230	230
n-Hexane	960	--	200	200
2-Hexanone	45,000	--	16,000	16,000
Methylene Chloride (Dichloromethane)	16,000	990	2,300	990
Methyl Ethyl Ketone	58,000	--	27,000	27,000
Methyl Isobutyl Ketone	3,800	--	3,800	3,800
Styrene	41,000	--	1,700	1,700
Tetrachloroethene (PCE)	5,500	480	370	370

Table 2.1-1
Generic Numerical Soil Standards – Future Industrial Land Use (mg/kg)
(Continued)

Chemical of Concern	Single Chemical Noncarcinogens	Single Chemical Carcinogens	Soil Saturation	Single Chemical Generic Direct Contact Standard*
Toluene	5,600	--	520	520
1,1,1-Trichloroethane	9,800	--	1,400	1,400
Vinyl Chloride	--	2.50	1,200	2.50
Total Xylenes	1,000,000	--	1,500	1,500
Trichloroethene (TCE)	3,300	330	820	330
Semivolatile Organic Chemicals				
2-Methylnaphthalene	76,000	--	--	76,000
Acenaphthene	18,000	--	--	18,000
Anthracene	91,000	--	--	91,000
Benzo(a)anthracene	--	31	--	31
Benzo(b)fluoranthene	--	31	--	31
Benzo(g,h,i)perylene	9,100	--	--	9,100
Benzo(k)fluoranthene	--	310	--	310
Benzo(a)pyrene	--	3.1	--	3.1
Bis (2-ethylhexyl) phthalate	3,100	860	31,000	860
Bromodichloromethane	1,000	2.30	--	2.30
n-Butylbenzene	19,000	--	250	250
Carbazole	--	2,000	--	2,000
Chlorobenzene	180	--	--	180
Chloromethane	--	2.60	--	2.60
Chrysene	--	3,100	--	3,100
Dibenzo(a,h)anthracene	--	3.1	--	3.1
Dibenzofuran[(2)]	3200	--	--	3200
Dibromochloromethane	11,000	470	13,000	470
1,2-Dichlorobenzene	3,300	--	370	370
Fluoranthene	12,000	--	--	12,000
Fluorene	12,000	--	--	12,000
Hexachlorobutadiene	210	38	--	38
Indeno(1,2,3-cd)pyrene	--	31	--	31
Naphthalene	22,000	--	--	22,000
Phenanthrene	91,000	--	--	91,000
Phenol	300000	--	--	300000
Pyrene	9,100	--	--	9,100
1,2,4-Trimethylbenzene	1000000	--	260	260
1,3,5-Trimethylbenzene	1000000	--	200	200
PCBs	--	--	--	25
Total Petroleum Hydrocarbons				
For Vertical Hydraulic Conductivity of the Unsaturated Soil (K_v) <10^{-5} cm/s				
Petroleum Hydrocarbons (PHC)	--	--	--	20,000

Table 2.1-1
Generic Numerical Soil Standards – Future Industrial Land Use (mg/kg) (Continued)

Chemical of Concern	Single Chemical Noncarcinogens	Single Chemical Carcinogens	Soil Saturation	Single Chemical Generic Direct Contact Standard*
PHC >C-10	--	--	--	40,000
For Vertical Hydraulic Conductivity of the Unsaturated Soil (K_v) 10^{-4} - 10^{-5} cm/s				
PHC	--	--	--	10,000
PHC >C-10	--	--	--	20,000

*The Single Chemical Generic Direct Contact Standard is the most conservative (lowest) of the Single Chemical Carcinogen Standard, Single Chemical Noncarcinogen Standard, and Soil Saturation Standard

Key:

cm/s = Centimeters per second
mg/kg = Milligrams per kilogram
-- = No standard
(1) Chromium VI was used as the generic numerical soil standard for total chromium.
(2) The EPA Region IX PRG for industrial soil was used.

Sources:

OAC 3745-300-08, Paragraph (B)(3)(a)(ii)(e), Table I: Total Petroleum Hydrocarbon Soil Saturation Concentrations

OAC 3745-300-08, Paragraph (B)(3)(e), Table IV: Generic Direct-Contact Soil Standards for Carcinogenic and Noncarcinogenic Chemicals of Concern-Industrial Land Use Category.

OAC 3745-300-08, Paragraph (B)(3)(g), Table V: The Generic Direct-Contact Standards for Polychlorinated Biphenyls.

OAC 3745-300-08, Paragraph (B)(3)(h), Table VI: The Generic Direct-Contact Standards for Lead.

Supplemental Generic Numerical Values: Voluntary Action Program Technical Assistance, Direct Contact Soils: Industrial Land Use Category (References 333 and 340).

The generic direct contact soil standards presented in Paragraph (B)(3) of OAC 3745-300-08 assume a single chemical of concern is present on a property. When more than one chemical of concern is present on a property, the concentrations of the single chemical generic numerical standards and supplemental generic cleanup numbers must be adjusted to reflect the cumulative effects of multiple chemicals, as described under Paragraph (B)(2)(b) of OAC 3745-300-08. This multiple chemical adjustment is performed separately for carcinogens and noncarcinogens. Cumulative effect calculations are not required for PCB or lead; however, the cumulative risk adjustment is performed for all chemicals of concern listed in the generic numerical standard tables presented under Paragraph (B)(3) of the rule.

Groundwater Standards. Generic unrestricted potable use standards for groundwater are contained in Paragraph (C)(3) of OAC 3745-300-08 and are presented for chemicals of concern at AFP85 in Table 2.1-2. The standard for most chemicals is the maximum contaminant level (MCL) developed under the Safe Drinking Water Act. The MCLs consider other factors and assumptions in addition to the carcinogenic and noncarcinogenic risk of the chemical.

Supplement of Numerical Standards. In addition to generic numerical standards presented in OAC 3745-300-08, supplemental generic cleanup standards have been developed by the VAP Technical Assistance Program. The latest supplemental standards used are from the document dated May 1999 (Reference 340). The values have been developed using the same input assumptions for exposure factor terms as found in *Support Document for the Development of Generic Numerical Standards and Risk Assessment Procedures* (Reference 328) and for chemical-specific toxicity and physio-chemical values determined from the information hierarchies described in OAC 3745-300-09. Standards for chemicals of potential concern at AFP85 presented in Tables 2.1-1 and 2.1-2 include supplemental numerical standards. Groundwater values are draft values pending verification by OEPA.

There is no standard for dibenzofuran. The OEPA Division of Emergency and Remedial Response (DERR) does not recommend a toxicity value for the quantitative assessment of dibenzofuran because the risk posed by non-substituted dibenzofuran is not considered substantial (Reference 331). However, a memorandum from DERR emphasizes the importance of analysis for substituted, halogenated dibenzofuran and dibenzodioxin compounds when the dibenzofuran is present at a location as the result of several circumstances. At AFP85, none of the conditions described as favorable for the production of substituted dibenzofurans apply. Therefore, analysis for these substituted forms did not need to be performed.

If a compound does not have a generic numerical standard or if the certified professional believes that the generic numerical standard should not be applied to a property, a property-specific risk assessment is required. Conditions that make generic numerical standards inapplicable are detailed in OAC 3745-300-08. The generic numerical standards are only applicable if none of those listed circumstances apply.

Preliminary Remediation Goals (PRGs). The latest version of U.S. Environmental Protection Agency (USEPA) Region IX Preliminary Remediation Goals (PRGs) will be used as an additional supplement where VAP standards do not exist for a detected compound. Those compounds which do not have a VAP standard and for which a PRG has been entered will be denoted in each table.

Table 2.1-2
Generic Unrestricted Potable Use Standards for Groundwater ($\mu g/L$)

Chemical of Concern	Noncarcinogens	Carcinogens	MCL	Generic Unrestricted Potable Use Standard*
Volatile Organic Chemicals				
Carbon Disulfide	880	--	--	880
Chloroform	--	--	--	100
1,1-Dichloroethane	1500	--	--	1500
cis-1,2 Dichloroethene	--	--	70	70
Dichloromethane (Methylene Chloride)	--	--	5.0	5.0
Toluene	--	--	1000	1000
trans-1,2 Dichloroethene	--	--	100	100
Semivolatile Organic Chemicals				
Phenol	9400	--	--	9400
Total Petroleum Hydrocarbons				
Petroleum Hydrocarbons above C-10	--	--	--	--
Inorganic Compounds				
Antimony	--	--	6.0	6.0
Arsenic	--	--	50	50
Barium	--	--	2000	2000
Beryllium	31	--	4.0	4.0
Cadmium	--	--	5.0	5.0
Chromium	--	--	100	100
Mercury	--	--	2.0	2.0
Nickel (soluble salts)	--	--	100	100
Selenium	--	--	50	50
Thallium	1.2	--	2.0	1.2
Zinc	4700	--	--	4700

*The Generic Unrestricted Potable Use Standard is the most conservative (lowest) value of the noncarcinogenic carcinogenic, and MCL values.

Key:

--	=	No standard
µg/L	=	Micrograms per liter

Sources:

OAC 3745-300-08, Paragraph (C)(3)(c), Table VII: Generic Unrestricted Potable Use Standards.

Supplemental Generic Numerical Values: Voluntary Action Program Technical Assistance, Unrestricted Potable Use Groundwater (Reference 333 and 340).

2.2 COMPARISON OF BACKGROUND CONCENTRATIONS TO APPLICABLE STANDARDS

The desired end result of the Ohio VAP is closure of all sites identified for land transfer during the Phase I Property Assessment. This section provides the guidelines used to evaluate the data gathered during the Phase II Property Assessment. For each site, the analytical data were compared by medium (i.e., soil, groundwater, and concrete) to background concentrations and, in some cases, to applicable standards. Where possible, background concentrations were determined based on the requirements of OAC 3745-300-07(I). Essential nutrients (i.e. calcium, iron, magnesium, potassium, and sodium) are not chemicals of concern and, therefore, data comparisons for all media types excluded essential nutrients; results for these analytes are included in appendices of this report. Data comparisons determined whether the site can be recommended for closure or whether it must remain active for further evaluation or remediation. Table 2.2-1 summarizes the number and type of background samples collected during Phase II-Fall 98.

A subsection on background data QC is included in the individual media discussions. Completeness calculations were made based on the description included in subsection 3.18.

Table 2.2-1
Summary of Samples Collected at Background Locations

Sampling Point	Soil(1)	Groundwater(2)	Surface Water(3)	Sediment(4)	Other(5)
New Wells	18	4	--	--	--
Boreholes	13	--	--	--	--
Grab Samples	--	--	2	2	3

Key:

-- = No samples collected

(1) Soil analytical suite: inorganics (SW3050/6010/7421), volatile organic compounds (SW8260), diesel range organics (modified SW8015), gasoline range organics (modified SW8015), PCBs/pesticides (SW3550/8080), semivolatile organic compounds (SW5030/8270),and soil moisture (ASTM D2216).
(2) Groundwater analytical suite: inorganics (filtered and unfiltered) (SW3050/6010/7421), volatile organic compounds (SW8260), diesel range organics (modified SW8015), gasoline range organics (modified SW8015), PCBs/pesticides (SW8080), and semivolatile organic compounds (SW3510/8270).
(3) Surface water analytical suite: inorganics (SW3005/6010/7421), volatile organic compounds (SW8260), diesel range organics (modified SW8015), gasoline range organics (modified SW8015), PCBs/pesticides (SW8080), and semivolatile organic compounds (SW3510/8270).
(4) Sediment analytical suite: inorganics (SW3050/6010/7421), volatile organic compounds (SW8260), diesel range organics (modified SW8015), gasoline range organics (modified SW8015), PCBs/pesticides (SW3550/8080), and semivolatile organic compounds (SW5030/8270).
(5) Concrete chip analytical suite: inorganics (SW3050/SW6010).

2.2.1 Soil

Standards. The land on which AFP85 is located will be deed restricted for industrial uses only; therefore, the soil analytical data gathered during Phase II-Fall 98 were compared to the generic numerical soil standards for industrial land use presented in OAC 3745-300-08. The standards for chemicals of concern detected in soil at AFP85 are listed in Table 2.1-1. These generic direct contact soil standards assume a single chemical of concern is present on a property. Because all sites at AFP85 contained more than one chemical of concern, the concentrations of the single chemical generic numerical standards and supplemental generic numerical standards were adjusted to reflect the cumulative effects of multiple chemicals. The adjusted standards are presented in Section 4 on tables that summarize analytical results for each site.

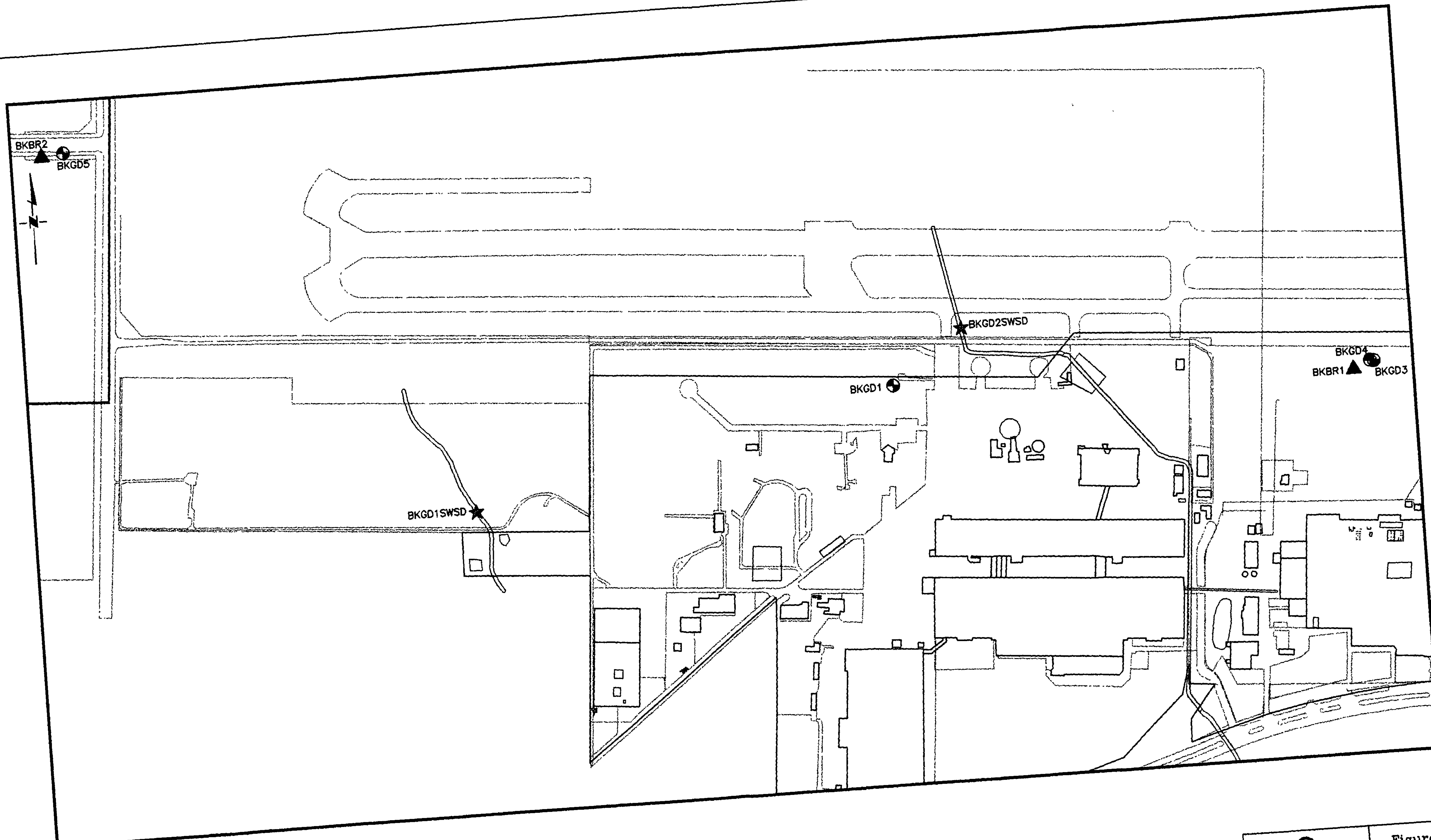
For soil, the maximum concentration of each analyte was compared to the VAP standard, which was modified to consider the presence of multiple chemicals. Although the concentrations were evaluated for all sampling depths, the generic direct contact soil standards for industrial land use typically apply to chemicals of concern in soil from the surface to a minimum depth of 2 feet.

The standards apply at depths below 2 feet when it is anticipated that soils will be made available for chronic direct contact exposure through excavation, grading, drilling, or other circumstances. Therefore, if the maximum concentration exceeded VAP standards, the depth at which the detection occurred is evaluated when determining recommendations.

Background. Thirty-one background soil samples were collected at six sampling locations shown in Figure 2.2-1. The requirements for background sampling included in OAC 3745-300-07(I) were reviewed prior to and during the field investigation. While eight background soil locations were planned with inclusion of six monitoring wells, observations made during drilling did not warrant the installation of two of the wells. Discussions were held with OEPA during the investigation to ensure data collected would provide adequate quantities and quality to determine background concentrations. Thirteen of these soil samples were collected at background borehole locations, including seven samples at BKBR1 and six samples at BKBR2. Eighteen soil samples were collected at background monitoring well locations, including six samples at BKGD1, three samples at BKGD3, six samples at BKGD4, and three samples at BKGD5.

The following inorganic chemicals were detected in background soil samples: arsenic, barium, cadmium, chromium, mercury, nickel, and zinc. Volatile organic compounds (VOCs) detected in background soil samples included 2-hexanone, acetone, carbon disulfide, carbon tetrachloride, chloroform, methyl ethyl ketone, methyl isobutyl ketone, and methylene chloride. Semivolatile organic compounds (SVOCs) detected in background soil samples included 2-methylnaphthalene, bis(2-ethylhexyl)phthalate, naphthalene, and phenanthrene. TPH was also detected in background samples. Table 2.2-2 presents the analytes and concentrations detected in background soil samples.

Table 2.2-3 presents the adjusted VAP standards and maximum detected concentrations for background soil samples. No maximum concentrations exceeded the adjusted VAP soil standards. For this reason, soils data discussed in Section 4 of this report will not be compared to background concentrations.



11/98

Installed Background Monitoring Well

Background Surface Water/Sediment Location

Background Borehole Location

0 250 500 1000

Scale in Feet

EARTH TECH

Figure 2.2-1

Background Sample Locations

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKGD1S0-01N 9/15/98 5 - 7 ft bgs	BKGD1S0-02N 9/15/98 10 - 12 ft bgs	BKGD1S0-03N 9/15/98 15 - 17 ft bgs	BKGD1S0-04N 9/15/98 20 - 22 ft bgs	BKGD1S0-05N 9/16/98 25 - 27 ft bgs	BKGD1S0-06N 9/16/98 30 - 32 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	9190	7310	6350	7770	3360	5770
Antimony	1 2	1 3 U	1 2 U	0 42	1 2 U	0 56
Arsenic	21 9	10 5	11 6	12 5	10 5	10 2
Barium	130	35 6	54 5	63 1	16 4	134
Beryllium	0 32	0 27	0 23	0 18	0 12	0 2
Cadmium	0 6	0 27	0 26	0 37	0 15	0 4
Chromium (Total)	15 2	11.7	11	12 8 J	6 2	10 1
Cobalt	15 9	8 7	8 9	8 7	3 9	6 2
Copper	36 9	24 2	22 5	24 2	15 5	21 3
Iron	30600	17400	19600	20700	9870	17700
Lead	15	9 9	11	11	4 7	10 3
Manganese	405	350	394	392	292	390
Nickel	49.7	27 3	28 1	26 6	14 6	21 8
Selenium	0 85 U	0 66 U	0 62 U	0.64 U	0 61 U	0 64 U
Thallium	2 2	1 2	1 2	0.91	1 2 U	1
Vanadium	23	18 9	15 3	19 5	10 9	21 4
Zinc	140	60 6	65	71 J	32 1	72 2
Analyte	**Mercury by SW7471 (mg/kg)**					
Mercury	0 14	0 15	0 14	0 13 U	0 081	0 14
Analyte	**Volatiles by SW8260 (ug/kg)**					
2-Hexanone	34 U	26 U	25 U	25 UJ	24 U	25 U

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKGD1S0-01N 9/15/98 5 - 7 ft bgs	BKGD1S0-02N 9/15/98 10 - 12 ft bgs	BKGD1S0-03N 9/15/98 15 - 17 ft bgs	BKGD1S0-04N 9/15/98 20 - 22 ft bgs	BKGD1S0-05N 9/16/98 25 - 27 ft bgs	BKGD1S0-06N 9/16/98 30 - 32 ft bgs
Acetone	34 U	6 1 J	5 1 J	25 U	8 6	35
Carbon Disulfide	8 5 U	6 6 U	6 2 U	6 4 U	6 1 U	6 4 U
Carbon Tetrachloride	8 5 U	6 6 U	6 2 U	6.4 U	6 1 U	6 4 U
Chloroform	8 5 U	6 6 U	6 2 U	6 4 U	6 1 U	6 4 U
Methyl Ethyl Ketone	34 U	26 U	25 U	25 UJ	24 U	7 4 J
Methyl Isobutyl Ketone	34 U	26 U	25 U	25 U	24 U	25 U
Methylene Chloride	4.5 J	6 6 U	6 2 U	12	22	27
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
2-Methylnaphthalene	560 U	440 U	410 U	420 U	400 U	420 U
bis(2-Ethylhexyl)phthalate	560 U	440 U	410 U	420 U	400 U	420 U
Naphthalene	560 U	440 U	410 U	420 U	400 U	420 U
Phenanthrene	560 U	440 U	410 U	420 U	400 U	420 U
Analyte	**TPH by M8015 (mg/kg)**					
PHC C10-C16	17 U	13 U	12 U	16	12	13 U
PHC C16-C32	17 U	23	28	39	25	13 U
Total Petroleum Hydrocarbons	170 U	130 U	120 U	130 UJ	120 U	130 U

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKBR1SO-01N0909 9/9/98 5 - 7 ft bgs	BKBR1SO-02N0909 9/9/98 10 - 12 ft bgs	BKBR1SO-03N0909 9/9/98 15 - 17 ft bgs	BKBR1SO-04N0909 9/9/98 20 - 22 ft bgs	BKBR1SO-05N0909 9/9/98 25 - 27 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**				
Antimony	0 97 J	0 59 J	0 7 J	0.76 J	1 J
Arsenic	14 8	19 7	11	9 2	11.8
Barium	137 J	59 4 J	50 6 J	94 4 J	42 7 J
Beryllium	0 57	0 29	0 49	0 48	0 4
Cadmium	0 57	0 26	0 37	0 22	0 32
Chromium (Total)	14 3 J	9 3 J	11 5 J	8 8 J	9 1 J
Cobalt	8	7	6 8	11 3	9 2
Copper	25 1 J	23 2 J	28 5 J	28 3 J	29 2 J
Iron	19800	19100	19200	32300	19400
Lead	12 3	9 7	8 3	10 1	13 4
Manganese	209	181	359	933	383
Nickel	31 2 J	25 4 J	23 J	24 J	25 1 J
Selenium	0 6 U	0 56 U	0 55 U	0 57 U	0.57 U
Thallium	1 5	1 1 U	1	0 82	1.2
Vanadium	25.9	14 5	26 6	15 5	16 9
Zinc	83 4 J	87.2 J	79 1 J	47 4 J	61 1 J
Analyte	**Mercury by SW7471 (mg/kg)**				
Mercury	0 037	0 024	0 022	0 11 U	0 022
Analyte	**Volatiles by SW8260 (ug/kg)**				
2-Hexanone	24 U	22 U	22 UJ	23 U	23 U
Acetone	74	4.2 J	37 J	24 J	34

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKBR1SO-01N0909 9/9/98 5 - 7 ft bgs	BKBR1SO-02N0909 9/9/98 10 - 12 ft bgs	BKBR1SO-03N0909 9/9/98 15 - 17 ft bgs	BKBR1SO-04N0909 9/9/98 20 - 22 ft bgs	BKBR1SO-05N0909 9/9/98 25 - 27 ft bgs
Carbon Disulfide	6 U	5.6 U	5.5 UJ	5.7 U	5.7 U
Carbon Tetrachloride	6 U	5.6 U	2.3 J	5.7 U	5.7 U
Chloroform	6 U	5.6 U	5.5 UJ	5.7 U	5.7 U
Methyl Ethyl Ketone	11 J	22 U	22 U	23 U	23 U
Methyl Isobutyl Ketone	24 U	22 U	22 UJ	23 U	23 U
Methylene Chloride	6 U	5.6 U	28 UJ	12 UJ	16 UJ
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
2-Methylnaphthalene	400 U	370 U	370 U	380 U	370 U
bis(2-Ethylhexyl)phthalate	400 U	370 U	78 J	380 U	43 J
Naphthalene	400 U	370 U	370 U	380 U	370 U
Phenanthrene	400 U	370 U	370 U	380 U	370 U
Analyte	**TPH by M8015 (mg/kg)**				
PHC C10-C16	12 U	11 U	11 U	11 U	11 U
PHC C16-C32	34	11 U	24	20	14
Total Petroleum Hydrocarbons	120 U	110 U	110 U	110 U	110 U

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKBR1SO-06N0909 9/9/98 30 - 32 ft bgs	BKBR01S0-07N0909 9/9/98 35 - 37 ft bgs	BKBR2S0-01N 9/14/98 5 - 7 ft bgs	BKBR2S0-02N 9/14/98 10 - 12 ft bgs	BKBR2S0-02D 9/14/98 10 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**				
Aluminum	-	-	11800	5050	3930
Antimony	0 75 J	0 66 J	0 94	0 71	0 77
Arsenic	10	11 3	28 J	20 J	17 9 J
Barium	149 J	189	78 2 J	52 1 J	79 5 J
Beryllium	0 27	0 4	0 55	0 32	0 27
Cadmium	0 47	0 23 U	0 3 UJ	0 7 J	0 33 J
Chromium (Total)	11 3 J	13	18 2	9 1	7 1
Cobalt	7	8 7	14	10 1	10 8
Copper	21 1 J	22 1	-	-	-
Iron	15900	18200	36300	22900	20100
Lead	9 1	2 8	17 4	13 4	11 6
Manganese	348	196 J	435	276 J	453 J
Nickel	24 5 J	23 4	51 J	36 9 J	33 5 J
Selenium	0 55 U	0 57 U	0 76 U	0 65 U	0 67 U
Thallium	1 1 U	1·1 U	1 8	1 5	1 3
Vanadium	23 1	10 5	34 9	16 4	13 5
Zinc	60 2 J	42 4 J	128 J	111 J	123 J
Analyte	**Mercury by SW7471 (mg/kg)**				
Mercury	0 024	0 11 U	0 14 U	0 16 U	0 12 U
Analyte	**Volatiles by SW8260 (ug/kg)**				
2-Hexanone	22 U	23 U	30 U	26 U	27 U

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKBR1SO-06N0909 9/9/98 30 - 32 ft bgs	BKBR01S0-07N0909 9/9/98 35 - 37 ft bgs	BKBR2S0-01N 9/14/98 5 - 7 ft bgs	BKBR2S0-02N 9/14/98 10 - 12 ft bgs	BKBR2S0-02D 9/14/98 10 - 12 ft bgs
Acetone	30	13 J	30 U	26 U	27 U
Carbon Disulfide	2 6 J	5 7 U	7.6 U	6 5 U	6 7 U
Carbon Tetrachloride	5 5 U	5.7 U	7 6 U	6 5 U	6 7 U
Chloroform	5 5 U	5 7 U	7 6 U	6 5 U	6 7 U
Methyl Ethyl Ketone	22 U	23 U	30 U	26 U	27 U
Methyl Isobutyl Ketone	22 U	23 U	30 U	26 U	27 U
Methylene Chloride	8 9 UJ	6 2 U	7.6 U	48 J	21 UJ
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
2-Methylnaphthalene	360 U	650	500 U	430 U	440 U
bis(2-Ethylhexyl)phthalate	360 U	380 U	500 U	430 U	440 U
Naphthalene	360 U	200 J	500 U	430 U	440 U
Phenanthrene	360 U	50 J	500 U	430 U	440 U
Analyte	**TPH by M8015 (mg/kg)**				
PHC C10-C16	13	11 U	15 U	13 U	13 U
PHC C16-C32	24	11 U	15 U	13 U	13 U
Total Petroleum Hydrocarbons	110 U	110 U	150 U	130 U	130 U

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKBR2S0-03N 9/14/98 15 - 17 ft bgs	BKBR2S0-04N 9/14/98 20 - 22 ft bgs	BKBR2S0-05N 9/14/98 25 - 27 ft bgs	BKBR2S0-06N 9/14/98 30 - 32 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	3890	5420	6800	5160
Antimony	0 4	0 59	0 48	0 5
Arsenic	9 6 J	15 2 J	20 8 J	17 6 J
Barium	94 J	44 7 J	60 3 J	49 1 J
Beryllium	0 2	0 27	0 37	0 35
Cadmium	0 18 J	0 3 J	0 25 J	0 46 J
Chromium (Total)	7 1	9 6	10 8	10 1
Cobalt	5 4	9 8	11 4	15 8
Iron	16000	19600	22300	22300
Lead	8 7	17 8	14 1	15 9
Manganese	263	361	432	327
Nickel	20 5 J	39 2 J	35 8 J	34 8 J
Selenium	0 68	0 66 U	0 65 U	0 66 U
Thallium	1 3 U	1 1	1 4	1 7
Vanadium	13 4	15 9	19 7	15 7
Zinc	98 J	76 7 J	91 4 J	151 J
Analyte	**Mercury by SW7471 (mg/kg)**			
Mercury	0 093 U	0 15 U	0 1 U	0 1 U
Analyte	**Volatiles by SW8260 (ug/kg)**			
2-Hexanone	26 U	26 U	26 U	26 U
Acetone	26 U	26 U	26 U	26 U

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKBR2S0-03N 9/14/98 15 - 17 ft bgs	BKBR2S0-04N 9/14/98 20 - 22 ft bgs	BKBR2S0-05N 9/14/98 25 - 27 ft bgs	BKBR2S0-06N 9/14/98 30 - 32 ft bgs
Carbon Disulfide	6 5 U	3 2 J	3 8 J	2 4 J
Carbon Tetrachloride	6 5 U	6 6 U	6 5 U	6 6 U
Chloroform	6 5 U	6 6 U	6 5 U	6 6 U
Methyl Ethyl Ketone	26 U	26 U	26 U	26 U
Methyl Isobutyl Ketone	26 U	26 U	26 U	26 U
Methylene Chloride	6 5 U	90 J	68 UJ	110
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
2-Methylnaphthalene	430 UJ	440 U	430 U	440 U
bis(2-Ethylhexyl)phthalate	430 UJ	440 U	430 U	440 U
Naphthalene	430 UJ	440 U	430 U	440 U
Phenanthrene	430 UJ	440 U	430 U	440 U
Analyte	**TPH by M8015 (mg/kg)**			
PHC C10-C16	21	13 U	13 U	13 U
PHC C16-C32	48	13 U	20	13 U
Total Petroleum Hydrocarbons	130 U	130 U	130 U	130 U

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKGD3S0-01N0910 9/10/98 5 - 7 ft bgs	BKGD3S0-02N0910 9/10/98 10 - 12 ft bgs	BKGD3S0-03N0910 9/10/98 15 - 17 ft bgs	BKGD3S0-03D0910 9/10/98 15 - 17 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Antimony	1 J	1	0 62 J	0 79 J
Arsenic	13	13 6	8 7	7 6
Barium	57	39 1	16 6 J	27 2 J
Beryllium	0 22	0 35	0 23	0 31
Cadmium	0 46	0 29	0 29 J	0 12 J
Chromium (Total)	8 5	9	4 8 J	8 3 J
Cobalt	7 2	7 8	4 4 J	8 7 J
Copper	23 4	28 7	20 8 J	42 6 J
Iron	17000	21200	13700 J	27500 J
Lead	9 4	12 1	8 3	9 5
Manganese	277 J	307 J	359 J	746 J
Nickel	30 1	24 6	14 J	22 4 J
Selenium	0 56 U	0 54 U	0 54 U	0 55 U
Thallium	1 2	1 1 U	1.1 UJ	0 92 J
Vanadium	12 8	15	9 9	13 9
Zinc	79 7 J	79 1 J	104 J	41 1 UJ
Analyte	**Mercury by SW7471 (mg/kg)**			
Mercury	0 027 U	0 022 U	0 11 U	0 11 U
Analyte	**Volatiles by SW8260 (ug/kg)**			
2-Hexanone	23 U	22 U	22 U	22 U
Acetone	23 U	22 U	22 UJ	7 3 J

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKGD3S0-01N0910 9/10/98 5 - 7 ft bgs	BKGD3S0-02N0910 9/10/98 10 - 12 ft bgs	BKGD3S0-03N0910 9/10/98 15 - 17 ft bgs	BKGD3S0-03D0910 9/10/98 15 - 17 ft bgs
Carbon Disulfide	5 6 U	5 4 J	5 4 U	5 5 U
Carbon Tetrachloride	5 6 U	0 58 J	5 4 U	5 5 U
Chloroform	5 6 U	5 4 U	5 4 U	5 5 U
Methyl Ethyl Ketone	23 U	22 U	22 U	22 U
Methyl Isobutyl Ketone	23 U	22 U	22 U	22 U
Methylene Chloride	5 6 U	7 3 U	15 UJ	7 5 UJ
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
2-Methylnaphthalene	370 UJ	360 UJ	360 U	370 U
bis(2-Ethylhexyl)phthalate	370 UJ	360 UJ	360 U	370 U
Naphthalene	370 UJ	360 UJ	360 U	370 U
Phenanthrene	370 UJ	360 UJ	360 U	370 U
Analyte	**TPH by M8015 (mg/kg)**			
PHC C10-C16	11 U	11 U	11 U	11 U
PHC C16-C32	11 U	26	21	24
Total Petroleum Hydrocarbons	1000	110 U	110 U	110 U

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKGD4S0-01N0911 9/11/98 5 - 7 ft bgs	BKGD4S0-02N0911 9/11/98 10 - 12 ft bgs	BKGD4S0-03N0911 9/11/98 15 - 17 ft bgs	BKGD4S0-04N0911 9/11/98 20 - 22 ft bgs	BKGD4S0-05N0911 9/11/98 25 - 27 ft bgs	BKGD4S0-06N0911 9/11/98 30 - 32 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	-	-	-	-	-	8620
Antimony	0 58	1	1 1	0 75	0 83	0 62
Arsenic	8 3	13 3	20 3	13 4	12 4	14
Barium	113 J	52 J	26 J	31 2 J	23 6 J	240
Beryllium	0 33	0 41	0 44	0 49	0.34	0 28
Cadmium	0 78	0 23	0 34	0 45	0 32	0 54
Chromium (Total)	8 7 J	12 9 J	9 1 J	10.7 J	6 8 J	14 1
Cobalt	4.1	8 4	11 2	9	6 4	9
Copper	17 9	23 9	27 7	35	23 3	26 4
Iron	12900	21300	35500	25600	16200	22700
Lead	10 8	11 3	27 2	12 8	8 7	11 1
Manganese	177	351	1410	652	451	399
Nickel	20 9 J	31 4 J	27 1 J	28 8 J	22 9 J	32 4
Selenium	0 68 U	0 64 U	0.63 U	0.67 U	0.64 U	1 1
Thallium	1 4	1 1	1 9	1	0 9	1 2
Vanadium	12 9	21 2	19 1	22 8	15 4	28 9
Zinc	82 2 J	81 7 J	48 3 J	59 5 J	41 9 J	89 1
Analyte	**Mercury by SW7471 (mg/kg)**					
Mercury	0 034	0 13 U	0 13 U	0 13 U	0 13 U	0 029
Analyte	**Volatiles by SW8260 (ug/kg)**					
2-Hexanone	27 U	26 U	25 U	5 5	26 U	26 UJ

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID / Date Sampled / Depth	BKGD4S0-01N0911 9/11/98 5 - 7 ft bgs	BKGD4S0-02N0911 9/11/98 10 - 12 ft bgs	BKGD4S0-03N0911 9/11/98 15 - 17 ft bgs	BKGD4S0-04N0911 9/11/98 20 - 22 ft bgs	BKGD4S0-05N0911 9/11/98 25 - 27 ft bgs	BKGD4S0-06N0911 9/11/98 30 - 32 ft bgs
Acetone	27 U	15 J	5 J	16 J	26 U	16 J
Carbon Disulfide	6 8 U	6 4 U	6 3 U	6 7 U	1 8 J	6 6 U
Carbon Tetrachloride	6 8 U	6 4 U	6 3 U	6 7 U	6 4 U	6 6 U
Chloroform	6 8 U	0 85 J	6 3 U	6 7 U	6 4 U	0 55 J
Methyl Ethyl Ketone	27 U	26 U	25 U	6 3 J	26 U	26 U
Methyl Isobutyl Ketone	27 U	26 U	25 U	4 5 J	26 U	26 U
Methylene Chloride	6 8 U	5 3 J	3 8 J	8 1 J	7 7 UJ	29
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
2-Methylnaphthalene	450 UJ	420 U	420 U	440 U	420 U	430 U
bis(2-Ethylhexyl)phthalate	450 UJ	420 U	420 U	440 U	420 U	150 J
Naphthalene	450 UJ	420 U	420 U	440 U	420 U	430 U
Phenanthrene	450 UJ	420 U	420 U	440 U	420 U	63 J
Analyte	**TPH by M8015 (mg/kg)**					
PHC C10-C16	14 U	13 U	13 U	13 U	13 U	20
PHC C16-C32	14 U	16	19	16	13 U	43
Total Petroleum Hydrocarbons	140 U	130 U	130 U	130 U	130 U	130 UJ

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKGD5S0-01N 9/14/98 5 - 7 ft bgs	BKGD5S0-02N 9/14/98 10 - 12 ft bgs	BKGD5S0-03N 9/14/98 15 - 17 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**		
Aluminum	-	-	6730
Antimony	0 75 J	0 36 J	0 51
Arsenic	20 6	11 6	12 7
Barium	89 9	30 2	52 7
Beryllium	0 63	0.11	0 29
Cadmium	0 63	0 3	0 27
Chromium (Total)	15 9 J	6 6 J	10 7
Cobalt	13 7 J	4.6 J	8 5
Copper	34 8	15.8	30 9
Iron	27300	12800	20800
Lead	14 3	7.1	9 8
Manganese	472	211	332
Nickel	46 7 J	16 J	27 6
Selenium	0 63 U	0 69 U	0 64 U
Thallium	1.3	1 4 U	0 94
Vanadium	36 7	13 4	18
Zinc	117 J	71 2 J	77
Analyte	**Mercury by SW7471 (mg/kg)**		
Mercury	0 13 U	0 14 U	0 1
Analyte	**Volatiles by SW8260 (ug/kg)**		
2-Hexanone	25 UJ	28 UJ	26 U
Acetone	25 U	28 UJ	26 U
Carbon Disulfide	6 3 U	6 9 U	1 6 J

Table 2.2-2

Summary of Analyte Concentrations for Soil Samples
Background

Sample ID Date Sampled Depth	BKGD5S0-01N 9/14/98 5 - 7 ft bgs	BKGD5S0-02N 9/14/98 10 - 12 ft bgs	BKGD5S0-03N 9/14/98 15 - 17 ft bgs
Carbon Tetrachloride	6 3 U	6 9 U	6 4 U
Chloroform	6 3 U	6 9 U	6 4 U
Methyl Ethyl Ketone	25 UJ	28 UJ	26 U
Methyl Isobutyl Ketone	25 U	28 UJ	26 U
Methylene Chloride	6 3 UJ	6 9 U	17 J
Analyte	**Semivolatiles by SW8270 (ug/kg)**		
2-Methylnaphthalene	420 U	460 U	50 J
bis(2-Ethylhexyl)phthalate	74 J	460 U	420 U
Naphthalene	420 U	460 U	420 U
Phenanthrene	420 U	460 U	44 J
Analyte	**TPH by M8015 (mg/kg)**		
PHC C10-C16	13 U	14 U	13 U
PHC C16-C32	13 U	14 U	14
Total Petroleum Hydrocarbons	130 UJ	140 U	130 U

Note: Soil sample results are reported on a dry weight basis
Sample IDs BKBR2SO-02D and BKGD3SO-03D0910 are field duplicates

Key:

-	=	Analyte was not analyzed for the indicated sample(s)
bgs	=	Below ground surface
J	=	Indicates an estimated value
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 2.2-3

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Background

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	11800
Arsenic	86 00	28
Barium	140000 00	240
Beryllium	30	0 63
Cadmium	300 00	0 78
Cobalt	10000	15 9
Chromium (Total)	2800 00	18 2
Copper	70000	42 6
Iron	100000	36300
Manganese	45000	1410
Nickel	3700 00	51
Lead	2800	27 2
Antimony	220	1 2
Selenium	10000 00	1 1
Thallium	160	2 2
Vanadium	14000	36 7
Zinc	370000 00	151
Mercury by SW7471		
Mercury	230 00	0 15
Volatiles by SW8260		

Table 2.2-3

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Background

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Acetone	55000 00	0 074
Carbon Disulfide	720	0 0038
Carbon Tetrachloride	15.00	0 0023
2-Hexanone	16000	0 0055
Methyl Ethyl Ketone	27000 00	0 011
Methyl Isobutyl Ketone	3800 00	0 0045
Methylene Chloride	990 00	0 11
Chloroform	0 52	0 00085
Semivolatiles by SW8270		
bis(2-Ethylhexyl)phthalate	860 00	0 15
2-Methylnaphthalene	76000 00	0 65
Naphthalene	22000 00	0 2
Phenanthrene	91000 00	0.063
TPH by M8015		
PHC C10-C16	20000	21
PHC C16-C32	40000	48
Total Petroleum Hydrocarbons	60000	1

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: mg/kg = Milligrams per kilogram

2.2.2 Groundwater

Standards. For groundwater, the maximum concentration of each analyte was compared against the VAP standard contained in Paragraph (C)(3) of OAC 3745-300-08. The standards for chemicals of concern detected in groundwater at AFP85 are listed in Table 2.1-2. Because the standards are primarily MCLs that consider other factors and assumptions in addition to the carcinogenic and noncarcinogenic risk of the chemical, cumulative risk adjustments do not need to be performed.

Background. Four groundwater samples were collected at background monitoring well locations, one from each of the following newly-installed and newly-developed monitoring wells: BKGD1, BKGD3, BKGD4, and BKGD5. Background monitoring wells BKGD2 and BKGD6 could not be installed as planned due to observed aquifer thickness which did not warrant well pairs in these two locations.

The following inorganic chemicals were detected in background groundwater samples: arsenic, barium, chromium, mercury, nickel, and zinc. The following VOCs were detected: carbon disulfide, chloroform, and methylene chloride. Phenol was the only SVOC detected in background groundwater.

Filtered and unfiltered metals samples were collected for all groundwater samples. Although there are differences between the total inorganics results and the dissolved inorganics results, all results were less than the VAP Generic Unrestricted Potable Use Standards ruling out the concern of contaminant levels present in groundwater due to turbidity.

Table 2.2-4 presents the VAP generic unrestricted potable use standards and analytical results for background groundwater concentrations; no maximum concentrations exceeded the VAP standards. For this reason, groundwater data discussed in Section 4 of this report will not be compared to background concentrations. Section 4 presents comparison tables of VAP standards to maximum concentrations in groundwater for each site (i.e., nonbackground) sample.

2.2.3 Concrete Materials

Concrete chip samples were analyzed for inorganic analytes at two sites. Analytical results from concrete chip samples were compared against inorganic concentrations detected in background samples collected within the same building (Building 3). If the concentration of an analyte detected in the sample exceeded the background concentration for that analyte, the sample was then compared to the VAP soil standard (see Table 2.1-1). The single chemical generic numeric standard was used. During a telephone conversation held on November 12, 1998, OEPA recommended the soil standard be used as a guideline for comparison to concrete chip data. OEPA further recommended the condition of the concrete as well as the future intended use of the site be considered. No sample concentrations exceeded the VAP standards. The intended use of each site and the concrete condition are discussed in Section 4.

Table 2.2-4

Summary of Analyte Concentrations for Groundwater Samples Background

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	BKGD1GW-01N 9/22/98	BKGD3GW-01N 9/21/98	BKGD4GW-01N 9/21/98	BKGD4GW-01D 9/21/98	BKGD5GW-01N 9/21/98
Analyte	**Inorganics (Total) by SW6010 (ug/L)**					
Arsenic	NA	11 1	9 5	8 1	7 8	26 8
Barium	2000	364	194	103	108	196
Chromium (Total)	100	13 1	8 5	5 U	5 U	30 6
Nickel	100	15 8	40 U	40 U	40 U	49 9
Zinc	4700	91 5 U	74 9 U	28 4 UJ	50 UJ	196
Analyte	**Inorganics (Dissolved) by SW6010 (ug/L)**					
Arsenic	NA	4	5 6	8 8 U	7 9 U	10 U
Barium	2000	283	169	98 4	98 3	71 3
Chromium (Total)	100	5 U	5 U	5 U	5 U	5 U
Nickel	100	40 U	40 U	40 U	40 U	40 U
Zinc	4700	24 2 U	26 2 U	21 7 U	18 8 U	50 U
Analyte	**Mercury (Total) by SW7471 (ug/L)**					
Mercury	2	0 2 U	0 2 U	0 2 U	0 074 UJ	0 096 U
Analyte	**Mercury (Dissolved) by SW7471 (ug/L)**					
Mercury	2	0 2 U	0 2 U	0 2 U	0 2 U	0 081
Analyte	**Volatiles by SW8260 (ug/L)**					
Carbon Disulfide	880	1 U	1 U	1 U	1 U	0 22 J
Methylene Chloride	5	4 4	3 4 U	1 U	1 U	1 U
Analyte	**Semivolatiles by SW8270 (ug/L)**					
Phenol	9400	10 U	10 U	3 4 J	10 UJ	10 U

Table 2.2-4

Summary of Analyte Concentrations for Groundwater Samples
Background

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	BKGD1GW-01N 9/22/98	BKGD3GW-01N 9/21/98	BKGD4GW-01N 9/21/98	BKGD4GW-01D 9/21/98	BKGD5GW-01N 9/21/98

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard
Sample ID BKGD4GW-01D is a field duplicate

Key:

J	=	Indicates an estimated value
U	=	Not detected
ug/L	=	Micrograms per Liter
UJ	=	Indicates the analyte was analyzed for but not detected The sample detection limit is an estimated value

3.0 FIELD PROCEDURES

The Phase II-Winter 99 investigation began on January 19, 1999, and included concrete chip and wipe sampling, liquid grab sampling, monitoring well installation, subsurface soil sampling, and groundwater sampling. Field activities concluded on February 26, 1999. Prior to beginning intrusive sampling such as drilling and direct push sampling, geophysical surveys and soil gas surveys were conducted to determine the most desirable locations for ground penetration. A description of each field activity is provided in this section. Additionally, this section presents the field and laboratory QC programs.

General field procedures are provided in this section, while site-specific exceptions and analytical data are detailed in Section 4 of this report.

3.1 SAMPLE SUMMARY

Table 3.1-1 outlines the total number of samples, by media type, collected at the individual sites.

Table 3.1-1
Summary of Samples Collected – Phase II-Winter 99

Sampling Site	Soil	Groundwater	Soil Gas	Concrete Chip	Concrete Wipe	Aqueous/ Liquid
Firing Range and Magazine (FIRINGRANG)	13					
AST 279 (271-279)	10	5				
IWTP Process Tanks (282-282A, 282-282B, 282-282C)	43					
Autoclave Pit (3-AUTOCPIT)	16	2			2	1
Thermodynamics Lab 271 (271-ACVPIT)	11	1				1
Drains (13, 13-WRACK)	7					
IRP 1 – Magnesium Chip Burn Site	8	2				
IRP 2 – Coal Pile Leachate Site	24	4				
IRP 6 – Rubble Disposal Site	7	1				
IRP 7 – Process Tank Acid Spill Site				22		
Jet Engine Test Cell (270)	9	4				
Metal Chip Bailer Pit (125-BAILER)	5					
Metal Chip Bailer Sump (125-SUMP)	12	1				1
3-Plenum				8		
Process Sewers (PSEWER)	14	1	20			
Quench Tank Pits (3-HTA)	7	1				
Salt Bath Furnace Pit (3-HTA)	2					
Sanitary Sewers (SSEWER)	16		40			
Septic Tanks (SPTANK3, SPTANK4)	13	2	41			
UST 3-102	6	1				
UST 3-105	6	3				
UST 7-290	7	2				
UST 8-93	3					
UST 8-94	8	1				
UST 8-95	10	2				
UST 8-115	7	1				
UST 8-116	10	2				
UST 9-91	7	2				
UST 125-FBA-3	15	1				
UST 270-289	8	3				
Used Battery Storage Area (9-BATST)	8					

3.2 GEOPHYSICAL SURVEYS

Earth Tech subcontracted all geophysical survey work to EnviroScan, Inc., located in Lancaster, Pennsylvania. This task was conducted January 25, 1999 through February 4, 1999. The purpose of the surveys was to locate and delineate any underground structures and/or utilities beneath proposed borehole locations for the sites to be investigated during Phase II-Winter 99. This work was conducted using ground penetrating radar (GPR), electromagnetics (EM), and magnetics (MAG) as necessary at each site.

GPR systems produce cross-sectional images of subsurface features and layers by continuously emitting pulses of radar frequency energy from a scanning antenna as it is towed along a survey profile. The radar pulses are reflected by interfaces between materials with differing dielectric properties. The reflections return to the antenna and are printed on a strip chart recorder or displayed on a video monitor as a continuous cross-section in real time.

Electromagnetic surveys were conducted using a TW-6 EM scanning device. The TW-6 detects any electrically conductive materials by creating an electromagnetic field with a transmitting coil. As the instrument is swept along the ground surface, subsurface conductive bodies distort the transmitted field. The change in field strength is sensed by the receiver, setting off an alarm.

Magnetics was also employed during the surveys using an FX-3 MAG instrument. The device measured the difference in total strength of the earth's magnetic field between two fixed heights above the ground surface. Where buried magnetic or ferromagnetic objects were present, the gradient varied rapidly as the instrument was swept along the ground surface.

3.3 CONCRETE CORING

To facilitate soil sample collection beneath the building floors and roadways, Concrete Coring Company, located in Enon, Ohio, was subcontracted to perform concrete coring. Six-inch-diameter cores were drilled through the concrete at the following direct push sampling locations: Industrial Wastewater Treatment Plant (IWTP) Process Tanks (282-282A, 282-282B, 282-282C), Autoclave Pit (3-AUTOCPIT), Thermodynamics Lab 271 (271-ACVPIT), Drains (13, 13-WRACK), Jet Engine Test Cell (270), Metal Chip Bailer Pit (125-BAILER) and Sump (125-SUMP), Quench Tank Pits (3-HTA), Salt Bath Furnace Pit (3-HTA), UST's 3-102, 3-105, 8-93, 8-94, 8-95, 8-115, 8-116, 9-91, 125-FBA-3, 270-289, and Used Battery Storage Area (9-BATST). Additionally, coring was conducted at various sample locations along the sanitary sewer (SSEWER) and process sewer (PSEWER) where concrete slabs existed.

All concrete surfaces that were cored during Phase II-Winter 99 were patched with like materials after sample collection was complete.

3.4 SOIL GAS SURVEY

This section outlines the field activities, procedures, protocols, quality control criteria, and technical approach used by Earth Tech and its subcontractor, Vironex Environmental Field Services, located in Newark, Delaware, during the shallow soil gas survey performed from February 8, 1999 through February 12, 1999. The results of the survey are also presented in this section.

3.4.1 Methods

A soil gas survey was conducted at three sites in areas of potential VOC sources. The location of sampling points and the sampling and analytical methods are described below. In general, the survey was conducted to identify the optimal soil boring locations based on VOC concentrations in soil gas.

Sample Locations. A total of 101 soil gas samples were collected from 3 sites at AFP85 during Phase II-Winter 99 activities. Forty samples were collected along the Sanitary Sewer (SSEWER). These samples were collected at a depth of 5 feet below ground surface (bgs) since the bottom of the sewer is approximately 8 to 10 feet bgs. Twenty soil gas samples were collected along the Process Sewer (PSEWER). These samples were collected at a depth of 5 bgs since the bottom of the sewer is approximately 8 to 10 feet bgs. Forty-one soil gas samples were collected at the septic tanks: SPTANK3 and SPTANK4. The samples at the septic tanks were collected at approximately 5 feet bgs. Sample locations are presented in Section 4 in the site-specific discussions.

Sample Collection. During soil gas sampling, hollow steel rods equipped with an expendable steel point were driven into the ground with a Geoprobe™ using hydraulic pressure and percussion hammering. Once the rods were driven to the desired sampling depth, the rods were pulled up approximately 6 inches to separate the rods from the expendable point and to create a void space. Inert Teflon™ tubing with an airtight adapter on the tip was inserted through the rods and threaded onto the driving rod, creating an airtight seal with the void space and the tubing. A new length of tubing was used for each soil gas sample. A manual vacuum pump was used to withdraw soil vapor from the void space through the tubing. Prior to sample collection, the tubing was purged of stagnant air to ensure a representative air sample was collected. Samples were collected in negative pressure glass jars provided by the Target mobile lab that performed the analysis. The pump apparatus was equipped with a protected needle that was used to puncture the septum on the top of the sample container, facilitating sample collection. The pump was purged with ambient air between each soil gas sample.

Sample Analysis. Soil gas samples were analyzed in Vironex's mobile lab with a gas chromatograph (GC) equipped with an electron capture detector (ECD). This apparatus is designed for detecting chlorinated compounds typically contained in industrial solvents following modified USEPA Method SW8010. Additionally, a flame-ionization detector (FID) was used for detecting those compounds that are diagnostic of petroleum products following modified USEPA Method SW8020.

3.4.2 Results

The results of the soil gas survey are presented in Appendix B. Total volatiles were the only contaminants detected during the soil gas survey. Of the forty gas samples collected at SSEWER, total volatiles were detected in one sample at a concentration of 16.0 micrograms per liter (μg/L). Of the twenty soil gas samples collected at PSEWER, total volatiles were detected in one sample at a concentration of 57.0 μg/L. Of the forty-one soil gas samples collected at SPTANK3 and SPTANK4, total volatiles were detected in three samples at concentrations ranging from 6.0 μg/L to 55.0 μg/L.

Further detail on site-specific soil gas concentrations and subsequent borehole locations are provided in Section 4 of this report.

3.5 DIRECT PUSH SOIL SAMPLING

Vironex was also subcontracted to perform direct push soil and groundwater sampling which was conducted from February 8 – 25, 1999. Soil samples were collected with a Geoprobe™ by hydraulically driving a hollow steel sampler into the ground. A combination of the macrocore and discrete samplers was employed at the site. The macrocore sampler is a 4-foot-long, 2-inch-diameter stainless steel sampler. The discrete sampler is a 2-foot-long, 1.5-inch-diameter sampler equipped with a piston-type apparatus that allows the sampler to be driven to a specific depth then opened to collect the soil sample. Both samplers contained a disposable, non-reactive, acetate liner. Samples were collected every five-foot interval, and soil boreholes were advanced to the final sample depth determined by the Phase II SOW or until refusal was encountered. Each site is discussed in detail in Section 4. An Earth Tech geologist supervised the collection of samples at each location. Vironex performed all direct push sampling services.

After sample collection, the liner was removed from the sampler and split open to expose the soil core, which was logged by an Earth Tech geologist. The sample recovery, composition, color, stratification, moisture content, and condition of the soil sample were recorded. A representative portion of each soil sample was placed in a Ziploc™ bag and allowed to equilibrate. Then, the headspace of each sample was measured with a Photovac™ photoionization detector (PID); the results are presented on the borehole logs. Borehole logs have been completed for each soil borehole and are included in Appendix C.

A representative portion of the soil sample was placed in laboratory-prepared glass jars for analytical testing. The portion selected was based on visual observation if discoloration was seen. Otherwise, a random grab sample was collected. The jars were labeled prior to filling with soil. Once filled, the jars were immediately placed on ice and stored on ice until delivered to the laboratory. Standard chain-of-custody (COC) protocol was followed. Site-specific discussions in Section 4 present a list of the soil samples collected during sampling activities and include the sample number, sample depth, date, and analyses performed for each sample.

3.6 DIRECT PUSH GROUNDWATER SAMPLING

Groundwater sampling was conducted during the Phase II-Winter 99 effort using various techniques. If an upper saturated zone was encountered at a soil boring and groundwater was readily available, dedicated Teflon™ tubing was lowered into the soil boring and the groundwater was withdrawn either manually using a check valve placed in the bottom of the tubing or by attaching a peristaltic pump to the tubing. Upon completion of the groundwater sampling, the tubing was removed from the soil boring and disposed to avoid cross-contamination. If groundwater was not readily available at a soil boring, a temporary piezometer was installed by inserting a 1-inch-diameter polyvinyl chloride (PVC) casing with a 5-foot screened interval. After allowing the piezometer to recharge, the groundwater samples were collected manually with either a bailer or dedicated Teflon™ tubing with a check valve. Due to the slow recharge of the piezometers, groundwater samples were composited over time; the start time and date were recorded as the sample time. Upon completion of the groundwater sampling, the temporary piezometer was removed from the soil boring.

3.7 MONITORING WELLS

This section describes the drilling methods and associated activities used to drill, sample, and abandon soil boreholes and to drill, sample, and install monitoring wells during the field investigation. All drilling was performed by Harriss Drilling Services, Inc., located in Freeburg, IL. Drilling and sampling methods followed procedures described in the *IRP Handbook* (USAF, 1993), the *OEPA Technical Guidance Manual for Hydrogeologic Investigations and Groundwater Monitoring* (OEPA, 1995), and the *Phase II SOW* (Reference 308). Drilling and sampling activities were supervised by a qualified Earth Tech geologist and were performed February 15-18, 1999. The location of all drilling sites was coordinated with the on-site POC prior to drilling.

Three boreholes were advanced during Phase II-Winter 99 field activities and were completed as monitoring wells, which will provide groundwater data regarding analyte concentrations. Monitoring well locations are depicted in figures included in Sections 4.7 and 4.8. All three monitoring wells were installed using hollow-stem auger drilling methods. During split-spoon and continuous tube soil sampling, the 6-inch inside diameter (ID) augers were used for the monitoring well locations. Monitoring wells installed were completed at depths ranging from 17 to 37 feet bgs.

3.7.1 Split-Spoon Sampling

Split-spoon sampling was performed in accordance with the general guidelines found in ASTM D-1586-84. Subsurface soil samples from monitoring well boreholes were collected using a 24-inch-long × 3-inch-diameter split-spoon sampler. In accordance with the Phase II SOW, samples were collected every five-foot interval for laboratory analysis. The maximum depth of each borehole was the lesser of 40 feet or refusal. The aliquot of soil collected was selected based on visual observation if discoloration was seen.

Once the hollow-stem augers were advanced to the desired depth, the split-spoon sampler was attached to sampling rods and lowered to the bottom of the borehole. The sampler was advanced with a 140-pound drop hammer until the entire length of the sampler was advanced or the sampler ceased to advance 6 inches within 50 blows of the hammer. The split-spoon sampler was then brought to the surface and a PID was used to measure organic vapors volatilizing from soil in the sampler. Soil from the split spoon was placed into glass sample jars, labeled, placed in a Ziplock™ plastic bags, and stored at 4°C in a portable cooler containing ice prior to and during transport to the laboratory for analysis. Remaining soil was then used for soil classification and headspace analysis in the field. All samples submitted to the laboratory were analyzed for VOCs, SVOCs, TPH, pesticides, PCBs, and inorganics.

3.7.2 Monitoring Well Installation

Monitoring wells were constructed of new and unused 4-inch-diameter, Schedule 40 PVC casing and screen. Monitoring well screens were factory slotted (0.01 inches) and were 10 feet in length. Flush-joint threaded connections were used instead of glue-connected fittings to prevent the introduction of contaminants into the monitoring well. The bottom of the screen was capped with a threaded PVC end cap.

Filter Pack. A filter pack consisting of clean silica sand was poured between the hollow-stem augers and monitoring well casing to fill the annular space between the screen and borehole wall. The filter pack was not tremied because of the shallow total depth of the monitoring wells; the sand had to fall through little or no groundwater during filter pack emplacement, thereby eliminating the possibility of bridging and the necessity of tremieing the sand. In order to prevent the possible collapse of the borehole wall, the level of the sand was not allowed to drop below the bottom of the hollow-stem augers during emplacement of the filter pack and removal of the augers.

Bentonite Seal. The bentonite seal was emplaced after the filter pack was installed and the top of the filter pack was measured relative to the ground surface. Dry bentonite chips (Wyo-Ben Enviroplug medium bentonite chips) were poured between the hollow-stem augers and monitoring well casing. To hydrate the bentonite, approximately five gallons of potable water was added for every 50 pounds of bentonite pellets. A minimum of 30 minutes was allowed for the bentonite to hydrate before the cement grout was emplaced.

Grout. The typical grout mixture consisted of 50 pounds of Type II Portland cement, four gallons of potable water, and two pounds of 100-percent sodium bentonite powder. The grout was mechanically blended and pumped into the annular space between the hollow-stem augers and the monitoring well casing. The grout was allowed to set for a minimum of 48 hours before surface completion and monitoring well development were completed.

Surface Completion. Aboveground surface completions for the background monitoring wells involved the installation of a 4-inch × 4-inch × 5-foot-long steel protective casing over the monitoring well casing. The protective casing was set in a 2-foot × 2-foot × 6-inch-thick concrete surface pad and extended approximately 2.5 feet above the ground surface. Three 3-inch-diameter × 5-foot-long concrete-filled steel guard posts were also installed around each monitoring well. The guard posts were set in individual concrete footings and extended 3 feet above the ground surface. Each monitoring well casing was capped with a water-tight PVC cap. A lockable lid was installed on each protective casing.

3.7.3 Monitoring Well Development

Each of the four background monitoring wells installed during Phase II-Winter 99 was developed no sooner than 48 hours after installation to allow time for the cement grout and concrete surface completion to set. Development activity for each monitoring well was recorded on a monitoring well development log.

Pumping was used for monitoring well development. A submersible Whales™ pump was used in all monitoring wells in an effort to remove a minimum of three times the monitoring well volume (WV) of groundwater from the wells. The following formula was used to calculate WV:

$$\textbf{Well Volume (WV)} = (TD - DTW) \times c$$

Where:	TD	=	Total depth of monitoring well,
	DTW	=	Depth to water, and
	c	=	Conversion factor (c = 0.6525 for a 4-inch ID casing).

The delay between monitoring well installation and development was sufficient to allow groundwater levels to recover in all four background monitoring wells. Development continued until the temperature, pH, and specific conductance were stable (temperature ±1°C, pH ±0.1 units, and specific conductance ±5 percent of the previous reading). Temperature, pH, and conductivity readings were collected using the YSI Model 3500 water quality meter.

A minimum of 3 WVs was removed from each monitoring well during development. Sediment was not allowed to remain in the bottom of the well. The color and volume of the discharge water were documented in logbooks. No detergents, soaps, acids, bleaches, or other additives were used to develop the monitoring wells.

3.7.4 Groundwater Sampling

Groundwater samples were collected from all three newly-installed background monitoring wells (IRP101, IRP201, and IRP202) along with 3 existing wells (PG-201, USW13, and USW16). All groundwater samples were analyzed for VOCs, diesel range organics (DRO), gasoline range organics (GRO), SVOCs, metals (filtered and non-filtered) and PCBs/pesticides. Section 4 lists the total number of samples collected on a site-specific basis for each sample type (e.g., environmental sample, duplicate, matrix spike, and matrix spike duplicate) and the types of analyses. Section 4 also provides a summary of the analytical results. Groundwater samples were collected from the four background monitoring wells no sooner than 24 hours following monitoring well development. This allowed the groundwater in the monitoring wells to return to equilibrium conditions. Groundwater sampling methods (discussed below) followed procedures described in the *IRP Handbook* (USAF, 1993) and the *Phase II SOW (*Earth Tech, 1998).

Screening of organic vapors with a calibrated PID was conducted when the well caps were removed. Prior to purging and sampling, the depth to bottom and depth to water were measured to nearest 0.01-foot. The volume of standing water in the well was then calculated as one purge volume. Three purge volumes were removed in each well to evacuate groundwater that was stagnant in the well and therefore not representative of the aquifer. Purging was accomplished using disposable polyethylene bailers. During purging, water quality was tested for temperature and pH using the YSI Model 3500 water quality meter and pH strips. Specific conductivity was not recorded because the water quality meter malfunctioned. Purging was considered complete when at least three purge volumes were removed from the well and the parameters had stabilized using the following criteria: temperature ±1°C and pH ±0.1 units. Because the groundwater level did not drop a significant amount below its static level, the groundwater sample was then collected for laboratory analysis immediately following purging.

Groundwater samples that were analyzed for VOCs were collected first using a disposable polyethylene bailer. Disposable nylon rope was used to lower and retrieve the bailers. A new disposable bailer and new length of nylon rope were used for each well. The VOC sample was collected from the bailer using a slow, controlled pour down the side of a tilted sample vial to minimize volatilization. The sample vial was filled until the meniscus was visible, and then the sample was immediately sealed. After the bottle was capped, it was inverted and gently tapped to ensure no air bubbles were present in the vial. Vials with trapped air were topped off, being careful not to lose preservative, until no bubbles were present. All sample vials were pre-preserved with hydrochloric acid (HCl) by the laboratory.

Groundwater samples that were analyzed for DRO, GRO, SVOCs and PCBs/pesticides were collected immediately following the collection of VOC samples. The samples were collected from the bailer using a slow, controlled pour down the side of a tilted sample bottle. Preservatives were not required for the DRO, GRO, SVOCs, and PCBs/pesticides samples.

Groundwater samples that were analyzed for metals were collected from the bailer using a slow, controlled pour down the side of a tilted sample bottle. All sample bottles collected for metals analysis were pre-preserved by the laboratory with nitric acid.

Samples were stored on ice in insulated coolers to cool the samples to 4°C. Samples were picked up daily by a courier from Kemron Labs and kept under strict COC. COCs are provided in Appendix K.

3.8 CONCRETE CHIP SAMPLING

Concrete chip samples were collected at locations previously determined in the Phase II SOW. A hammer drill with a 1¼-inch × 12-inch drill bit was used to penetrate the concrete floor while stainless steel spoons and stainless steel trowels were used to gather the concrete chips.

For lab purposes, the concrete samples were drilled into fine grains or powder to allow for proper sample preparation and analysis. In order to fill á four-ounce sample jar with concrete grains/powder, the drill bit penetrated the surface 4 inches.

3.9 CONCRETE WIPE SAMPLING

Concrete wipe sampling was conducted to determine if excess amounts of PCBs exist in the floor of the autoclave pit in Building 3 (3-AUTOCPIT). Details of sample locations and results are presented in Section 4.4.

One wipe sample was collected along each of two wall segments. A wipe pad preserved in hexane was used to collect the sample by stroking it 10 times horizontally and 10 times vertically over a 100 square centimeters (cm^2) area. The pad was returned to the sample jar, which was then tightly sealed, labeled, and placed into an ice-filled cooler. New sample gloves and cardboard templates were used for each sample to prevent cross-contamination. All wipe samples were analyzed for PCBs.

3.10 LIQUID GRAB SAMPLING

Liquid grab samples were collected from 3-AUTOCPIT, 271-ACVPIT and 125-SUMP. The liquid was collected as a grab sample with a Teflon dipper and placed directly into pre-preserved sample jars. Details of sample locations, analysis, and results are presented in Section 4 of the report.

3.11 MODIFICATIONS

Modifications to the Phase II SOW were made at the 9-BATST, 125-BAILER, and 3-HTA Salt Bath Furnace Pit and 3-HTA Quench Tank Pits based on field observation. Soil samples could not be collected at 9-BATST using a hand auger due to the large amounts of pea gravel in the area. Instead, direct push was conducted to two feet at each sample location at the site. At 125-BAILER, direct push sampling took place along the west side of building 125. Due to the extensive rack network, the direct push rig could not access the Metal Chip Bailer Pit area. Two hand auger samples were collected adjacent to the pit in place of the planned direct push samples. At 3-HTA Salt Bath Furnace Pit, borehole SALTDP-04 could not be accessed by Geoprobe due to its location in the corner of the building. SALTDP-01 met refusal at 1-foot bgs. No sample was collected for the proposed direct push borehole. At 3-HTA Quench Tank Pits, eight direct push soil samples were proposed. Soil could not be collected from borehole HTADP-08 due to no recovery and refusal at thirteen feet bgs. However, groundwater was encountered at approximately 10 feet and sampled.

3.12 SURVEYING

Upon completion of the field investigation, a global positioning system (GPS) was used by Canter Surveying, a certified land surveyor located in Athens, Ohio, to survey the outdoor soil borehole, and monitoring well locations. The GPS uses satellites to locate the positions; therefore, only locations outside of buildings were surveyed. The ground surface elevation, top of casing elevation, and horizontal location were surveyed for all newly-installed monitoring wells. Survey activities were conducted on February 24, 1999.

An xy-coordinate system was used to describe the horizontal location of each surveyed point, with the x-coordinate as the east-west axis and the y-coordinate as the north-south axis. Horizontal locations were referenced to the state plane coordinate system. Ground surface elevation was referenced to mean sea level and measured to the nearest $\pm$0.01-foot. The elevation of the top of the monitoring well casing was surveyed from a black mark on the casing, referenced to mean sea level, and surveyed to the nearest $\pm$0.01-foot.

3.13 WASTE HANDLING

The following section describes the procedures for handling and disposing of waste generated on-site during the field investigation. These wastes included soil cuttings, monitoring well development/purge water, and equipment decontamination fluids.

Soil cuttings, monitoring well development/purge water, and equipment decontamination fluids were containerized in 55-gallon drums and transported to a temporary staging area designated by AFP85 personnel. A total of 12 composite samples, 6 solid and 6 water, were collected from the drums by Earth Tech and analyzed by the laboratory for toxicity characteristic leaching procedure (TCLP) parameters (VOCs, SVOCs, pesticides, PCBs, herbicides, and metals). Soil was collected from each drum by digging 12 inches below surface level with a trowel. The soil was then placed into a stainless steel bowl for compositing. Water was collected from each drum with a beaker. The water was then poured into a decontaminated bucket for compositing. All of the soil cuttings and wastewater were disposed in accordance with State and Federal regulations by Clean Harbors, located in Cincinnati, Ohio. Analytical results and disposal procedures are presented in Section 5.

3.14 FIELD QC PROCEDURES

3.14.1 Recordkeeping

Two types of field records were maintained during the field investigation, including the daily field logs and COC forms.

Daily Field Logs. Information pertinent to the sampling program was recorded in water-resistant ink on waterproof, bound logbooks with consecutively numbered pages. Entries in the logbooks included the following:

- Documentation of weather conditions;
- Names and affiliations of on-site personnel;
- General description of each day's field activities;
- Sample information, including the date and time of sample collection and the sample number;
- Equipment calibration data;
- Borehole logs and monitoring well construction data;
- Water quality data; and
- Equipment Decontamination Logs.

Logbook pages were signed and dated by the author at the bottom of each page. Contemporaneous corrections to the logbooks were made by drawing a single line through the incorrect entry so that the incorrect entry was still readable; the correct information was then entered. Any subsequent error discovered was corrected, initialed, and dated by the person who made the entry.

Chain-of-Custody Forms. Proper sample COC was documented using preprinted forms. All samples collected were recorded on the COCs by Earth Tech personnel. A carbon copy of each COC was retained and archived in Earth Tech files. Copies of COC forms for soil and groundwater samples collected during Phase II-Winter 99 are presented in Appendix K.

3.14.2 Field QA Activities

To ensure that the field QA objectives were achieved as defined by the Phase II SOW, a series of QC activities were performed. Equipment blanks, duplicates, matrix spikes, and matrix spike duplicates were collected, and all field activities were documented in the field logbooks. Because several field personnel made entries into the logbooks, they were reviewed daily for correctness and completeness.

Trip Blanks. Trip blanks were used to quantify potential contamination of samples during shipment to the analytical laboratory. Trip blanks were received from the laboratory and were not opened in the field. Trip blanks were only returned to the laboratory and analyzed with samples collected for VOC and GRO analysis.

Equipment Blanks. Equipment blanks measure potential contamination from the concrete chip drill bit and hollow stem auger. An equipment blank is defined as de-ionized water that is poured into or pumped through (in the case of pumps) the sampling device, transferred to a sample bottle, and transported to a laboratory for analysis. An equipment blank was collected for each type of sampling device used. Equipment blanks were collected at a frequency of 10% of the number of normal samples. The equipment blanks were analyzed by the same analytical methods used to analyze the associated environmental soil, groundwater, and concrete samples.

Field Duplicates. Field duplicates are two samples collected independently at a sampling location during a single act of sampling. Duplicates were collected at a frequency of 10% the number of normal samples. Field duplicates were analyzed by the same analytical methods used to analyze the normal samples.

3.15 DECONTAMINATION

All downhole equipment, including drill shoes, direct push rods, and samplers used during soil, concrete, and groundwater sampling, was decontaminated between each sampling location using the following method: the equipment was washed in potable water and Alconox, rinsed with potable water, rinsed with methanol and pesticide-grade hexane, and allowed to dry completely. If samples at a particular location were to be analyzed for pesticides, the hexane rinse was omitted.

3.16 LABORATORY QA/QC PROGRAM

Kemron Laboratory, located in Marietta, Ohio and Quanterra Laboratory, located in Canton, Ohio are both Ohio-certified labs and have Quality Assurance Project Plan previously approved by OEPA. Laboratory QA/QC focused on ensuring that each chemical measurement had the highest probability of achieving the standards for precision and accuracy defined in the method protocol. QC samples such as laboratory control samples and duplicate samples were evaluated and documented on a routine basis. Spike and surrogate recoveries were calculated as appropriate. These QC data were compared on an ongoing basis to laboratory-established control limits. Traceable standards of the National Institute of Standards and Technology (NIST) were used for spiking compounds and surrogates. Frequencies and acceptance criteria for matrix spikes, laboratory control samples, and surrogate compounds for all methods used by both laboratories are included in their Standard Operating Procedures (SOPs). The various types of QC samples used to identify possible laboratory biases are discussed below.

3.16.1 Matrix Spikes

Spikes were used to evaluate matrix interferences and to maintain method control. Matrix spike samples are normal environmental samples that are spiked with designated compounds of interest to determine whether the environmental matrix affects the ability to quantify the concentration of the compounds of concern. Matrix spike (MS) and matrix spike duplicate (MSD) samples were designated by Earth Tech on the field COCs. One MS and one MSD sample were analyzed for every 20 normal samples. Percent recoveries and relative percent differences (RPDs) of the spiking compounds were calculated and compared with the corresponding laboratory-established control limits.

3.16.2 Laboratory Control Samples

Laboratory control samples (LCSs) were also used to maintain control of the analytical method. The LCS, which consists of ASTM Type II reagent-grade water spiked with the entire target compound list, is used to monitor the performance of the analytical method by matrix. Historical data of these LCSs are used to generate the control charts for which method trends were tracked. Percent recoveries of the spiked compounds were calculated and compared against the laboratory-established control limits.

3.16.3 Surrogate Compounds

Surrogate compounds are used to monitor matrix interferences and sample preparation techniques for gas chromatography/mass spectrometry (GC/MS) and GC analyses. Surrogate compounds are added to the environmental sample at the start of the analytical process and then recovery calculations are performed on surrogate spiking compounds. Surrogate compounds were added to every field and QC sample during laboratory sample preparation. Suitable surrogate compounds are not required for analysis, do not interfere with the determination of required analytes, are not naturally occurring, and are chemically similar to the required analytes. As with the spiking compounds, the surrogate percent recoveries were calculated and compared to their corresponding laboratory-established control limits.

3.16.4 Data Management

Both analytical laboratories submitted the analytical results to Earth Tech in hardcopy and electronic format. The Air Force Center for Environmental Excellence (AFCEE) requires submission of analytical methods and results in electronic Environmental Restoration Program Information Management System (ERPIMS) format. ERPIMS was formerly known as the Installation Restoration Program Information Management System (IRPIMS). Earth Tech used ERPTOOLs software to check analytical data results received from the laboratories and will submit the results to ASC in ERPIMS format. In addition, Earth Tech cross-checked the ERPIMS data against laboratory hardcopy reports for additional QC.

A database interface was developed by Earth Tech to produce the analytical results summary tables provided in Section 4 directly from the ERPIMS data. This improved efficiency and limited the potential for transcription errors in the table results.

3.17 QC SUMMARY

Data validation is a review of laboratory data packages to determine the quality of the data with respect to analytical method and guidance requirements. For this Phase II Property Assessment, 90% of the data underwent a Data Quality (Level III) Review, and the remaining 10% underwent a Complete (Level IV) Review. The laboratory data packages varied in the level of detail provided based on the level of data validation being performed.

Level III data packages included sample results and summary sheets of associated QC results, such as calibration summaries, MS/MSD summaries, and blank summaries. A Data Quality Review of a Level III data package included a review of blank contamination, surrogate spike recoveries, MS/MSD samples, field duplicates, holding times, and chain-of-custody forms. Level IV data packages included all information in the Level III data packages and all associated raw data such as chromatograms, quantitation reports, mass spectras, analysts notes, and bench sheets. A Complete Review of a Level IV data package included a review of blank contamination, surrogate spike recoveries, MS/MSD samples, field duplicates, holding times, chain-of-custody forms, initial and continuing calibrations, internal standards, instrument performance, documentation, and other raw data.

Samples were collected in accordance with the Phase II Property Assessment Statement of Work, and were analyzed in accordance with USEPA Solid Waste (SW-846), Third Edition, Test Methods for Evaluating Solid Waste. Currently, no data validation guidelines exist for SW-846 methodologies. Guidance for validation of the data packages was from the USEPA, Contract

Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, February 1994, and USEPA, Contact Laboratory Program National Functional Guidelines for Inorganic Data Review, February 1994. These guidelines were written for the CLP program and for CLP methodology, and therefore do not directly correlate to the SW-846 methodology. In cases where CLP guidelines do not exist for a specific analytical method, the requirements for the analytical method were used as the basis for data validation.

The following qualifiers were placed on data as necessary:

Qualifier	Description
R	The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.
J	The analyte was positively identified, the value is an estimation.
UJ	The analyte was analyzed for, but not detected. The sample detection limit is an estimated value.
U	The analyte was analyzed for, but not detected at or above the stated limited.

The data quality objective (DQO) for completeness is 95% for water, 90% for soil, 95% for concrete wipes, and 95% for concrete chips. The completeness for a data set is calculated as a percentage of the number of valid results divided by the total number of results (data points). A valid result is a data point that is not qualified with a 'R' qualifier. Data points qualified 'J' or 'UJ' are estimated values and are treated as valid data points in completeness calculations. The formula for completeness is presented below:

$$\text{Completeness} = \frac{\text{Number of valid results (valid data points)}}{\text{Total number of results (data points)}} \times 100$$

In Section 4 of this Phase II Property Assessment Report, completeness is calculated for each site by matrix and analysis.

4.0 PHASE II-WINTER 99 RESULTS AND RECOMMENDATIONS

The following section presents activities conducted under the VAP at each site during the Phase II-Winter 99 field investigation. The objective of the sampling was to obtain sufficient information of acceptable quality to meet VAP requirements and to allow the property to be transferred from the USAF to 4300 East Fifth Avenue LLC. The type and number of samples collected to fulfill this DQO and the analytical suites for the samples are presented in the following subsections for each of the sites listed below.

- Firing Range and Magazine (FIRINGRANG)
- AST 279 (271-279)
- IWTP Process Tanks (282-282A, 282-282B, 282-282C)
- Autoclave Pit (3-AUTOCPIT)
- Thermodynamics Lab 271 (271-ACVPIT)
- Drains (13, 13-WRACK)
- IRP Site 1 – Magnesium Chip Burn Site
- IRP Site 2 – Coal Pile Leachate Site
- IRP Site 6 – Rubble Disposal Site
- IRP Site 7 – Process Tank Acid Spill Site
- Jet Engine Test Cell (270)
- Metal Chip Bailer Pit (125-BAILER)
- Metal Chip Bailer Sump (125-SUMP)
- 3-Plenum
- Process Sewers (PSEWER)
- Quench Tank Pits (3-HTA)
- Salt Bath Furnace Pit (3-HTA)
- Sanitary Sewers (SSEWER)
- Septic Tanks (SPTANK3, SPTANK4)
- UST 3-102
- UST 3-105
- UST 7-290
- UST 8-93
- UST 8-94
- UST 8-95
- UST 8-115
- UST 8-116
- UST 9-91
- UST 125-FBA-3
- UST 270-289
- Used Battery Storage Area (9-BATST)

Each site is discussed in individual subsections; the site history and summary of work previously performed is presented, followed by the activities conducted during Phase II-Winter 99. The results of the sampling efforts are presented in tables, and, if applicable, are compared to appropriate standards and background concentrations. The last subsection for each site discusses recommendations for the site based on the results, the condition of the site, and exceedances of standards. Each site is then classified in accordance with the categories used in the final Environmental Baseline Survey (EBS) (Reference 213). Category 4 sites are those for which all necessary environmental actions have been performed. Category 7 sites are those for which further environmental activities must be completed.

Results for each sample collected are compared to standards and background concentrations based on media type. Because the land on which AFP85 is situated is deed restricted for industrial uses only, the soil analytical data gathered during Phase II–Winter 99 are compared to the Generic Numerical Soil Standards listed in OAC 3745-300-08 for industrial land use. Since the background soil data collected are less than these standards, comparison to background concentrations is not included. Maximum groundwater concentrations were compared to the unrestricted potable use standards discussed in Section 2.0 of this report. A comparison to background concentrations is not included since they were less than the unrestricted standards. Concrete chip sample data are compared to background metals concentrations for those background samples collected within Building 3 during the Phase II-Fall 98 field effort, and are further compared to OEPA Industrial Land Use Soil Standards. Also, the integrity of the concrete and the future use of the individual site are considered in the recommendations.

For all media types, essential nutrients (i.e., calcium, iron, magnesium, sodium, and potassium) are not included in the data comparisons presented in the following subsections. However, complete analytical data packages are provided in the appendices of this report.

4.1 FIRING RANGE AND MAGAZINE (FIRINGRANG)

The firing range and an associated ammunition magazine storage building were formerly located just west of Building 25 on the north ramp. The range and building were demolished and removed when McDonnell Douglas took over operations in the 1980s.

4.1.1 Site Summary

According to on-site personnel, a soil removal was completed after operations ended (Reference 228). Because lead residues may be present (Reference 153), the area was investigated during the Phase II-Winter 99 effort.

4.1.2 Field Activities Conducted

Thirteen hand auger samples were collected at FIRINGRANG and were analyzed for lead. The locations are shown in Figure 4.1-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at FIRINGRANG				
Sampling Point	Soil(1)	Groundwater	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	--	--	--	--
Hand Auger to 6-inch	13	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	--
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Lead SW3050/SW7421, and soil moisture (ASTM D2216).

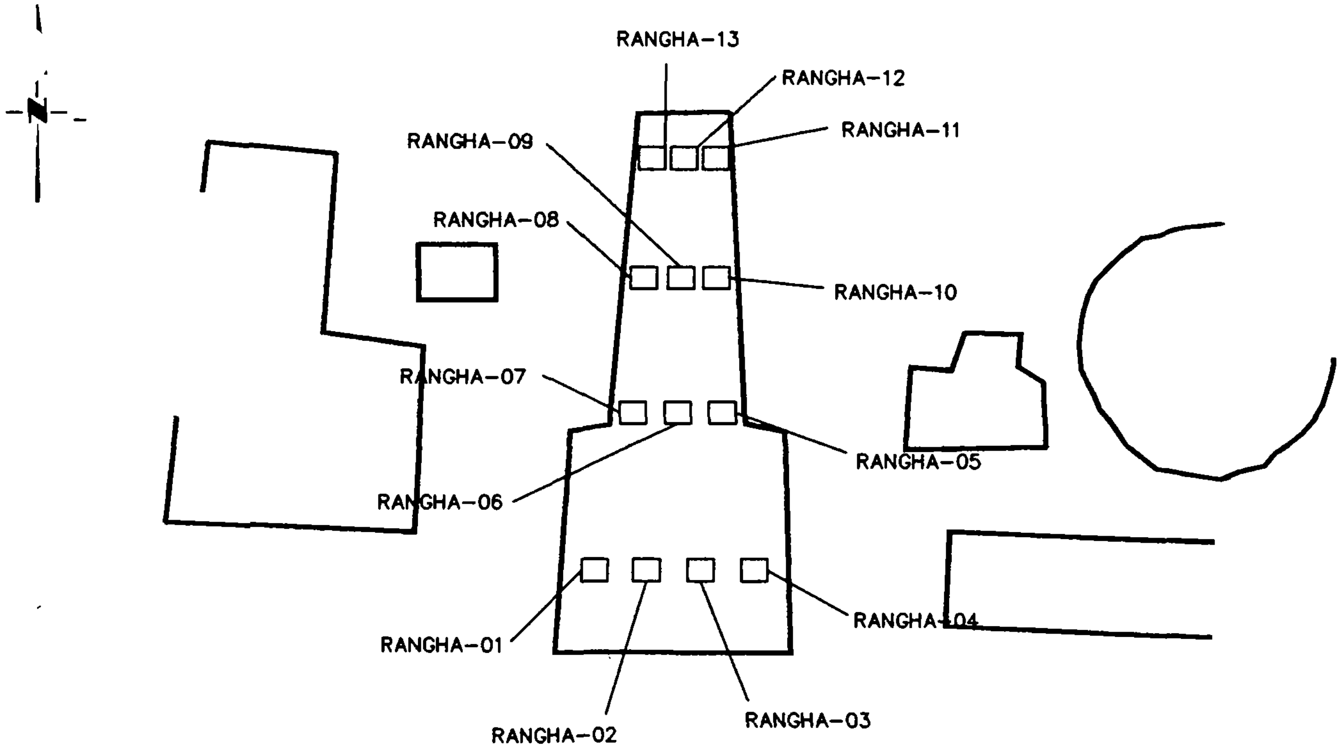
4.1.3 Results

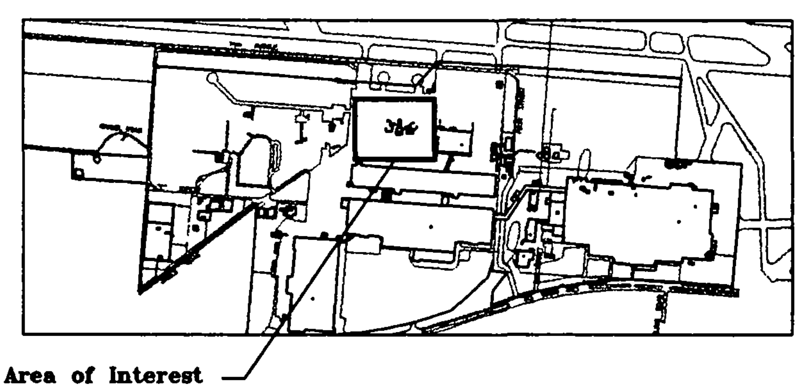
Lead was detected in all of the soil samples collected at the FIRINGRANG; concentrations are presented in Table 4.1-1. Table 4.1-2 presents a comparison between the maximum site concentrations and the adjusted VAP standard for lead. No analyte concentrations exceeded the adjusted standard.

4.1.4 Data Validation Summary

Thirteen soil samples and one soil duplicate were collected at the FIRINGRANG and were analyzed for lead.

All soil data points are useable. The following provides a summary of data validation results for samples collected at FIRINGRANG:





Legend

Hand auger Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.1-1

Firing Range and Ammunition Storage Buildings (FIRINGRANG) Soil Sample Locations

29179.4.1-5.DWG/PLT

Table 4.1-1

Summary of Analyte Concentrations for Soil Samples
Firing Range and Magazine (FIRINGRANG)

Sample ID Date Sampled Depth	RANGHA-01N 2/19/99 0 - 1 ft bgs	RANGHA-02N 2/19/99 0 - 1 ft bgs	RANGHA-03N 2/19/99 0 - 1 ft bgs	RANGHA-04N 2/19/99 0 - 1 ft bgs	RANGHA-05N 2/19/99 0 - 1 ft bgs	RANGHA-05D 2/19/99 0 - 1 ft bgs	RANGHA-06N 2/19/99 0 - 1 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Lead	52	35	76	22	94	100	140

Table 4.1-1

Summary of Analyte Concentrations for Soil Samples
Firing Range and Magazine (FIRINGRANG)

Sample ID Date Sampled Depth	RANGHA-07N 2/19/99 0 - 1 ft bgs	RANGHA-08N 2/19/99 0 - 1 ft bgs	RANGHA-09N 2/19/99 0 - 1 ft bgs	RANGHA-10N 2/19/99 0 - 1 ft bgs	RANGHA-11N 2/19/99 0 - 1 ft bgs	RANGHA-12N 2/19/99 0 - 1 ft bgs	RANGHA-13N 2/19/99 0 - 1 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Lead	41	160	56	100	98	25	42

Note: Sample ID RANGHA-05D is a field duplicate

Key:
bgs = Below ground surface
mg/kg = Milligrams per kilogram

Table 4.1-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Firing Range and Magazine (FIRINGRANG)		
Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Lead	2800	160

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
Lead	14	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.1.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of lead exist, no further action is recommended. FIRINGRANG is recommended for Category 4 designation.

4.2 AST 279 (271-279)

The AST located outside Building 279 contained fuel oil for the building boiler, and had an OEPA air permit.

4.2.1 Site Summary

In 1989, the below ground piping associated with the tank was pressure tested and the test results indicated the piping leaked. Following the test, the piping was disconnected and the tank was emptied. No additional investigations were conducted to determine the impact, if any, to the soil and groundwater. The AST was designated as Category 7 in the EBS (Reference 213) and further investigation was warranted.

4.2.2 Field Activities Conducted

Five boreholes were advanced at this location during the Phase II-Winter 99 effort. Each borehole was continuously sampled every five feet until groundwater or refusal. Ten direct push soil samples and five groundwater samples were collected at AST 279 and analyzed for SVOCs, GRO and DRO. Sample locations are shown in Figure 4.2-1. A sample for vertical conductivity determination was also collected. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at AST 279				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	10	5	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: diesel and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), and SVOCs (SW3550/SW8270).

(2) Groundwater analytical suite: diesel and gasoline range organics (modified SW8015) and SVOCs (SW3510/SW8270).

4.2.3 Results

SVOCs and TPH were detected in soil samples collected at AST 279; concentrations are presented in Table 4.2-1. Table 4.2-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Five boreholes were advanced at AST 279; depths ranged from 8 to 16 feet bgs. The soils encountered to 8 feet bgs varied from yellow brown to red brown silty clay with few cobble size gravel. Groundwater was encountered at 8 feet bgs. At 12 to 16 feet bgs, the color changed to gray brown silty clay with sand. A vertical conductivity value of 3.58 × 10-8 cm/s was reported for sample 279-01, collected at 10-12 feet bgs.

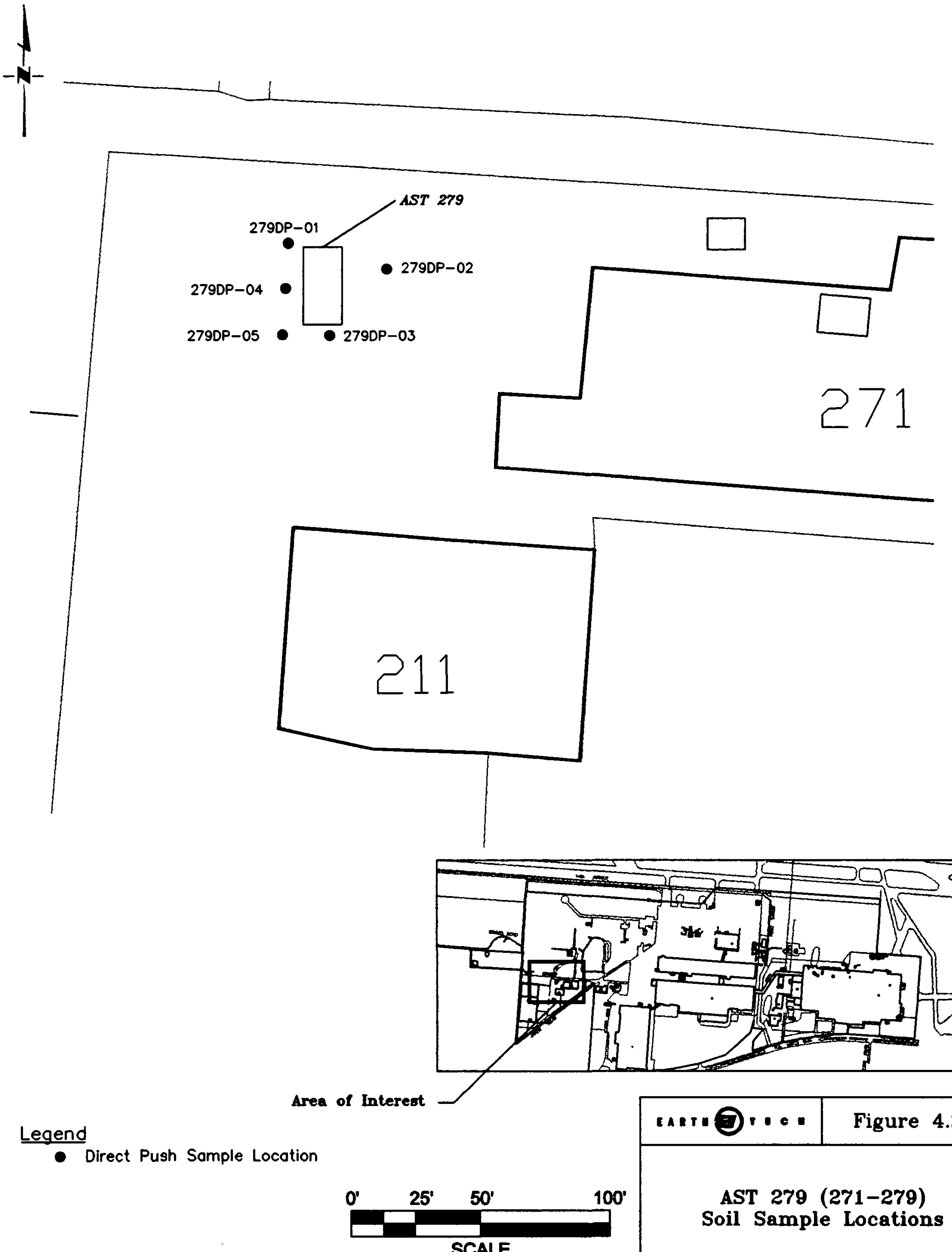


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Figure 4.2-1

AST 279 (271-279)
Soil Sample Locations

Table 4.2-1

Summary of Analyte Concentrations for Soil Samples
Aboveground Storage Tank 279 (271-279)

Sample ID Date Sampled Depth	279DP-0101N 2/11/99 0 - 4 ft bgs	279DP-0102N 2/11/99 4 - 8 ft bgs	279DP-0102D 2/11/99 4 - 8 ft bgs	279DP-0103N 2/11/99 8 - 12 ft bgs	279DP-0201N 2/11/99 0 - 4 ft bgs	279DP-0202N 2/11/99 4 - 8 ft bgs	279DP-0301N 2/11/99 0 - 4 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**						
di-n-Butylphthalate	440 U	380 U	48 J	380 U	380 U	380 U	420 U
Fluoranthene	440 U	380 U	380 U	52 J	380 U	380 U	420 U
Pyrene	440 U	380 U	380 U	59 J	380 U	380 U	420 U
Analyte	**TPH by M8015D (mg/kg)**						
PHC as Gasoline	0.13 U	0.11 U	0.11 U	0.29	0.11 U	0.12 U	0.13 U
PHC C10-C22	13 U	11 U	19	31	11 U	12 U	13 U

Table 4.2-1

Summary of Analyte Concentrations for Soil Samples
Aboveground Storage Tank 279 (271-279)

Sample ID Date Sampled Depth	279DP-0302N 2/11/99 4 - 8 ft bgs	279DP-0302D 2/11/99 4 - 8 ft bgs	279DP-0401N 2/11/99 0 - 4 ft bgs	279DP-0402N 2/11/99 4 - 8 ft bgs	279DP-0501N 2/10/99 4 - 8 ft bgs	279DP-0501D 2/10/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
di-n-Butylphthalate	410 U	420 U	410 U	390 U	380 U	370 U
Fluoranthene	410 U	420 U	410 U	390 U	380 U	370 U
Pyrene	410 U	420 U	410 U	390 U	380 U	370 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC as Gasoline	0 12 U	0 3	0 12 U	0 12 U	0 12 U	0 11 U
PHC C10-C22	12 U	13 U	12 U	12 U	12 U	12

Note: Sample IDs 279DP-0102D, 279DP-0302D and 279DP-0501D are field duplicates

Key:

bgs	=	Below ground surface
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.2-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Aboveground Storage Tank 279 (271-279)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
di-n-Butylphthalate	NA	0 048
Fluoranthene	12000 00	0 052
Pyrene	9100 00	0 059
TPH by M8015D		
PHC C10-C22	20000	31
PHC as Gasoline	8000	0 3

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Bis(2-ethylhexyl)phthalate and TPH were detected in groundwater samples collected at AST 279; concentrations are presented in Table 4.2-3. There were no detected concentrations that exceeded the respective VAP standard. Figure 4.2-2 shows the location where groundwater samples were collected.

4.2.4 Data Validation Summary

Ten soil samples, three soil duplicates, five groundwater samples and 2 groundwater duplicates were collected at AST 271-279 and were analyzed for semivolatiles and TPH (GRO and DRO).

All non-detect results for SVOC analysis for the groundwater sample 279GW-04N were qualified R and rejected due to a low percent recovery of surrogate spikes.

All soil data points are useable. All groundwater data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at AST 271-279:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	832	0	100%	0.5%	0%
TPH (GRO and DRO)	26	0	100%	23%	0%
Groundwater					
SVOCs	384	64	83.3%	0.3%	0%
TPH (GRO and DRO)	12	0	100%	16.6%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.2.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. AST 279 is recommended for Category 4 designation.

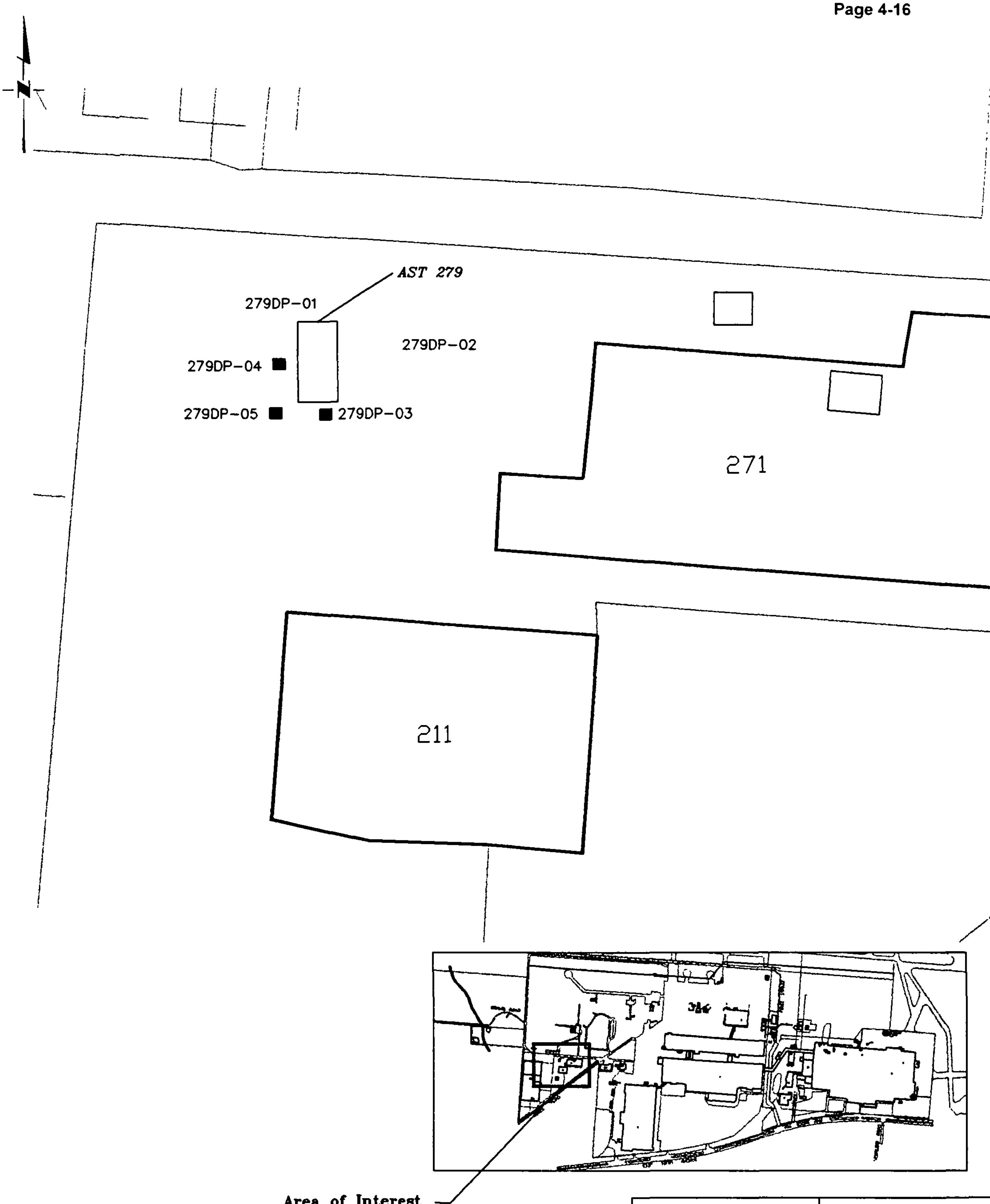
Table 4.2-3

Summary of Analyte Concentrations for Groundwater Samples
Aboveground Storage Tank 279 (271-279)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	279GW-01N 2/11/99	279GW-02N 2/11/99	279GW-03N 2/11/99	279GW-03D 2/11/99	279GW-04N 2/11/99	279GW-05N 2/10/99
Analyte	**Semivolatiles by SW8270 (ug/L)**						
bis(2-Ethylhexyl)phthalate	NA	4 2 J	39	10 U	10 U	10 U	10 U
Analyte	**TPH by M8015 (ug/L)**						
PHC C10-C22	NA	600	180	160	100 U	270	130

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard
Sample ID 279GW-03D is a field duplicate

Key:
J = Estimated
NA = Not available
U = Not detected
ug/L = Micrograms per Liter



Legend

- ● Direct Push Sample Location
- ■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

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Figure 4.2-2

AST 279 (271-279)
Groundwater Sample Locations

29179.41-5.DWG/PLT

4.3 IWTP PROCESS TANKS (282-282A, 282-282B, 282-282C)

These three tanks were used to hold process water at the on-site IWTP. All tanks are currently inactive.

4.3.1 Site Summary

During the site visit in February 1995 (Reference 160), the concrete apron at the base of the steel tanks appeared slightly deteriorated. No investigation concerning possible releases from these tanks has ever been conducted. It should be noted that there were no visual signs of past spills or leaks.

4.3.2 Field Activities Conducted

The IWTP Process Tanks were evaluated because no samples had been previously collected at the site and contaminants may have been released to the subsurface. The boreholes were placed after reviewing the soil gas results from the site. Refer to Section 3.0 and Appendix B for soil gas results. Eleven boreholes were advanced and sampled every five feet until groundwater or refusal. A total of 43 direct push soil samples were collected and analyzed for VOCs and metals. Groundwater was not reached and therefore no groundwater sample was collected. Also, a sample was collected for vertical conductivity determination. Borehole locations are shown in Figure 4.3-1. The following table presents the number of samples collected and the analyses performed.

Number of Samples Collected at 282-282A, B, C				
Sampling Point	Soil(1)	Groundwater	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	43	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Metals (SW3050/6010), volatile organic compounds (SW8260), soil moisture (ASTM D2216).

4.3.3 Results

Mercury and numerous inorganics and VOCs were detected in soil samples collected at the IWTP; concentrations are presented in Table 4.3-1. Table 4.3-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Eleven boreholes were advanced at the IWTP Process Tanks; depths ranged from 8 to 19.5 feet bgs. The soils encountered varied from yellow brown silty clay to clay, with trace sand and little gravel. Groundwater was encountered between 8 and 16 feet bgs at five of the boreholes. A vertical conductivity value of 3.82 × 10-8 cm/s was reported for sample 282DP-02 collected at 6-8 feet bgs.

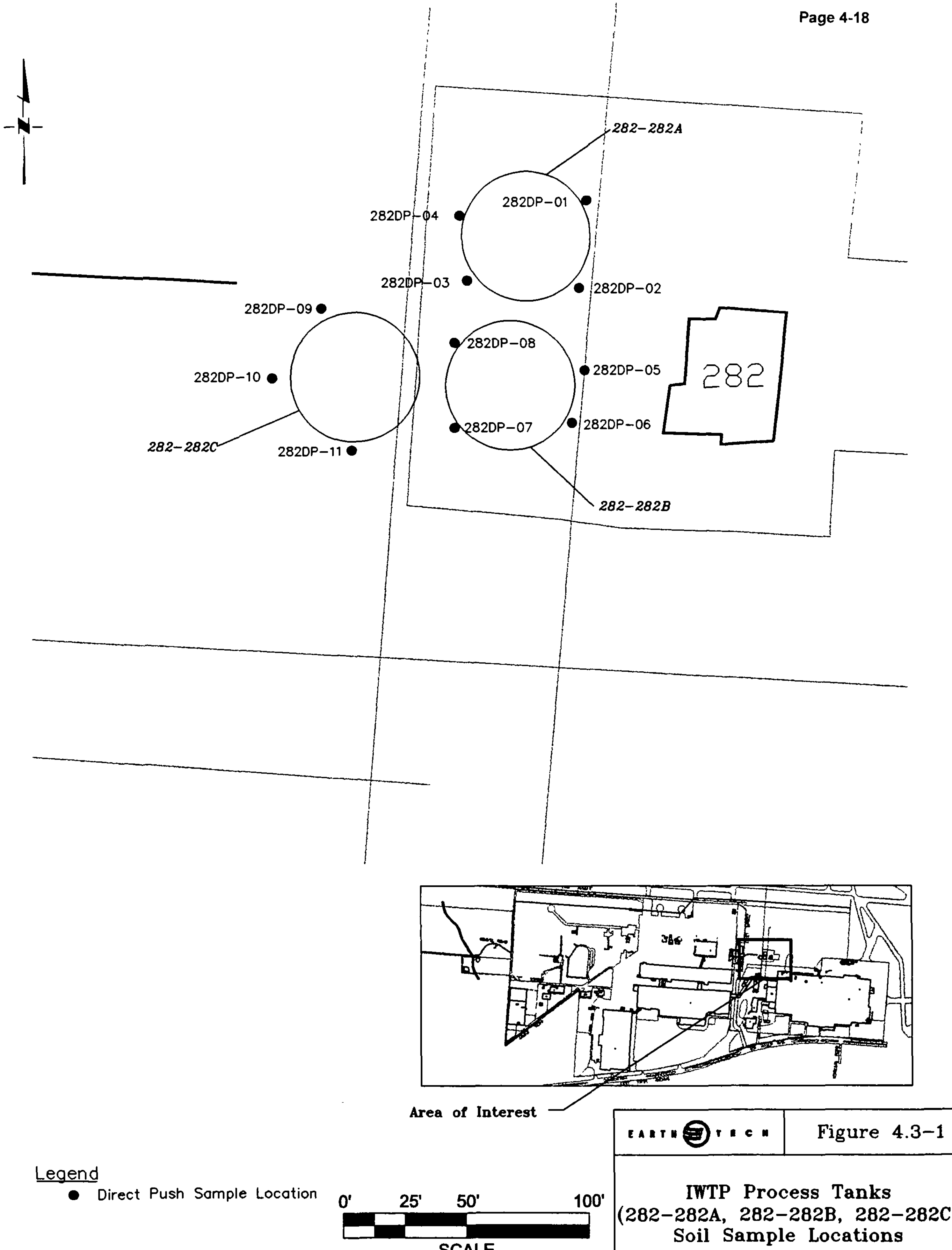

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Figure 4.3-1

IWTP Process Tanks
(282-282A, 282-282B, 282-282C)
Soil Sample Locations

29179.4.1-5.DWG/PLT

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0101N 2/16/99 0 - 4 ft bgs	282DP-0102N 2/16/99 4 - 8 ft bgs	282DP-0103N 2/16/99 8 - 12 ft bgs	282DP-0104N 2/16/99 12 - 16 ft bgs	282DP-0105N 2/16/99 16 - 18 ft bgs	282DP-0106N 2/16/99 18 - 19.5 ft bgs	282DP-0201N 2/18/99 0 - 4 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	21600	8270	6130	11400	11400	8620	12300
Arsenic	15 3	10 9	9 1	9	10 9	15 4	10 6
Barium	206	113	77 9	131	93	53 5	165
Beryllium	0 69	0 32 J	0 26 J	0 43 J	0 44 J	0 52 J	0 58 J
Cadmium	0 62 U	0 58 U	0 56 U	0 57 U	0 56 U	0 55 U	0 62 U
Chromium (Total)	24 3	11 6	9 1	14 9	13 7	15 2	15 5
Cobalt	10 6	12 2	7 5	8 8	7 2	6 5	7 5
Copper	25 4	20 8	19 3	20 1	19 4	28 7	20 3
Iron	29100 B	19000 B	16300 B	19000 B	18000 B	18000 B	21300
Lead	15 3	8 8	8 8	9 9	9	8 9	16 3
Manganese	523 B	723 B	240 B	277 B	311 B	230 B	325
Nickel	37 9	33 7	23 7	27 1	23 7	32 3	22 5
Selenium	0 62 U	0 58 U	0 56 U	0 57 U	0.56 U	0 55 U	0 62 U
Thallium	1 2 U	1 2 U	1 1 U	1 1 U	1 1 U	0 87 J	1 2 U
Vanadium	55 6	16 7	13 2	23 6	25 8	33 4	28 4
Zinc	90 9 B	60 B	57 5 B	68 B	56 B	69 8 B	87 1 B
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 059 J	0 033 J	0 039 J	0 037 J	0 039 J	0 039 J	0 078 J
Analyte	**Volatiles by SW8260 (ug/kg)**						
1,1,1-Trichloroethane	300 U	520	210 U	220 U	200 U	200 U	130 J
1,1-Dichloroethane	300 U	55 J	210 U	220 U	200 U	200 U	230 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples (Continued)
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0101N 2/16/99 0 - 4 ft bgs	282DP-0102N 2/16/99 4 - 8 ft bgs	282DP-0103N 2/16/99 8 - 12 ft bgs	282DP-0104N 2/16/99 12 - 16 ft bgs	282DP-0105N 2/16/99 16 - 18 ft bgs	282DP-0106N 2/16/99 18 - 19.5 ft bgs	282DP-0201N 2/18/99 0 - 4 ft bgs
cis-1,2-Dichloroethene	150 U	120 U	100 U	110 U	100 U	100 U	120 U
Trichloroethene	300 U	240 U	210 U	220 U	200 U	200 U	230 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0202N 2/18/99 4 - 8 ft bgs	282DP-0203N 2/18/99 8 - 12 ft bgs	282DP-0301N 2/17/99 0 - 4 ft bgs	282DP-0302N 2/17/99 4 - 8 ft bgs	282DP-0302D 2/17/99 4 - 8 ft bgs	282DP-0303N 2/17/99 8 - 12 ft bgs	282DP-0303D 2/17/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	10400	13800	10200	10800	9480	8960	9170
Arsenic	15 9	12 1	17 5	8 1	4 4	15 9	12
Barium	102	140	110	99 3	90	75 5	62 2
Beryllium	0 44 J	0 46 J	0 45 J	0 43 J	0 35 J	0 39 J	0 41 J
Cadmium	0 6 U	0 63 U	0 58 U	0 59 U	0.59 U	0 58 U	0 57 U
Chromium (Total)	14 7	21 3	14	14 8	13 5	12	12 3
Cobalt	11 3	7 2	9	9	5 7 J	12 4	7 8
Copper	26 5	24 3	28 9	20 2	15 5	25 2	23 7
Iron	24800	19600	24000 B	18200 B	12500 B	23200 B	21000 B
Lead	12 7	12	11 8	10 1	7 8	11 3	10 3
Manganese	384	361	365	315 B	327 B	336 B	208 B
Nickel	38.7	23 2	36 3	28 2	21 3	34 4	29 1
Selenium	0 6 U	0 63 U	0 58 U	0 59 U	0 59 U	0 58 U	0 57 U
Thallium	0 89 J	1 3 U	1 2 U	1 2 U	0 79 J	1 2 U	1 1 U
Vanadium	24 6	34 4	28 8	20 8	18 9	21 3	20 2
Zinc	86 9 B	75 8 B	97 1	67 1 B	63 6 B	87 7 B	78 B
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 049 J	0 054 J	0 053 J	0 042 J	0 044 J	0 037 J	0 041 J
Analyte	**Volatiles by SW8260 (ug/kg)**						
1,1,1-Trichloroethane	210 J	170 J	230 U	240 U	230 U	270 U	230 U
1,1-Dichloroethane	260 U	270 U	230 U	240 U	230 U	47 J	45 J

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples (Continued)
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0202N 2/18/99 4 - 8 ft bgs	282DP-0203N 2/18/99 8 - 12 ft bgs	282DP-0301N 2/17/99 0 - 4 ft bgs	282DP-0302N 2/17/99 4 - 8 ft bgs	282DP-0302D 2/17/99 4 - 8 ft bgs	282DP-0303N 2/17/99 8 - 12 ft bgs	282DP-0303D 2/17/99 8 - 12 ft bgs
cis-1,2-Dichloroethene	130 U	140 U	120 U	120 U	120 U	32 J	31 J
Trichloroethene	51 J	270 U	230 U	240 U	230 U	270 U	230 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID / Date Sampled / Depth	282DP-0401N 2/17/99 0 - 4 ft bgs	282DP-0402N 2/17/99 4 - 8 ft bgs	282DP-0501N 2/16/99 0 - 4 ft bgs	282DP-0502N 2/16/99 4 - 8 ft bgs	282DP-0503N 2/16/99 8 - 12 ft bgs	282DP-0503D 2/16/99 8 - 12 ft bgs	282DP-0504N 2/16/99 12 - 14 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	13000	11800	537	14100	8500	6510	6350
Arsenic	8 8	12 8	0 49 J	18 2	8 5	7 4	8
Barium	202	82 8	3 5 J	96 9	97 7	71 1	62 1 D
Beryllium	0 67	0 46 J	0 55 U	0 6	0 35 J	0 19 J	0 28 J
Cadmium	0 65 U	0 6 U	0 55 U	0 59 U	0 56 U	0 56 U	0 56 U
Chromium (Total)	16 2	16 3	5 5	16 7	11 4	10 2	9 5 D
Cobalt	6 9	8 2	5 5 U	11 5	7 8	8 8	7 4 D
Copper	18 8	27	2 J	34 5	17 8	20 3	19 6
Iron	22300 B	23400 B	3530 B	27500 B	16400 B	16300 B	15200 D
Lead	13 7	11 8	17 1	14 7	8 7	9 2	8 9 D
Manganese	322	227 B	28 2	483 B	228 B	254 B	297 D
Nickel	20 5	34 6	2 J	35 8	23 9	26 4	23 3 D
Selenium	0 91	0 6 U	0 55 U	0 59 U	0 56 U	0 56 U	0 56 U
Thallium	1 3 U	1 2 U	1 1 U	1 2 U	1 1 U	1 1 U	1 1 U
Vanadium	33 4	33 1	1 1 J	32 3	18	14 4	14 D
Zinc	80 4	99 9 B	20 1 B	71 4 B	57 7 B	65 5 D	57 6 D
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 071 J	0 048 J	0 03 J	0 045 J	0 036 J	0 04 J	0 04 J
Analyte	**Volatiles by SW8260 (ug/kg)**						
1,1,1-Trichloroethane	300 U	250 U	230 U	240 U	280 U	250 U	200 U
1,1-Dichloroethane	300 U	250 U	230 U	240 U	280 U	250 U	200 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples (Continued)
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0401N 2/17/99 0 - 4 ft bgs	282DP-0402N 2/17/99 4 - 8 ft bgs	282DP-0501N 2/16/99 0 - 4 ft bgs	282DP-0502N 2/16/99 4 - 8 ft bgs	282DP-0503N 2/16/99 8 - 12 ft bgs	282DP-0503D 2/16/99 8 - 12 ft bgs	282DP-0504N 2/16/99 12 - 14 ft bgs
cis-1,2-Dichloroethene	150 U	120 U	120 U	120 U	140 U	120 U	100 U
Trichloroethene	300 U	250 U	230 U	240 U	280 U	250 U	200 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0505N 2/16/99 14 - 16 ft bgs	282DP-0506N 2/16/99 16 - 17.5 ft bgs	282DP-0601N 2/18/99 0 - 4 ft bgs	282DP-0601D 2/18/99 0 - 4 ft bgs	282DP-0602N 2/18/99 4 - 8 ft bgs	282DP-0603N 2/18/99 8 - 11 ft bgs	282DP-0701N 2/17/99 0 - 4 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	9700	9370	5810	5270	6630	8920	9680
Arsenic	11 6	9 4	16 5	17 2	18	8 5	19 2
Barium	81 4	108	52 5	36 3	92 5	96 9	100
Beryllium	0 45 J	0 4 J	0 32 J	0 28 J	0 29 J	0 38 J	0 4 J
Cadmium	0 56 U	0 56 U	0 78	0 57 U	0 58 U	0 57 U	0 58 U
Chromium (Total)	12 8	12 5	13 4	10 4	10 1	12 3	12 9
Cobalt	11 3	7 5	7 6	6 5	10 9	8 3	15 4
Copper	22 1	19 3	22 3	21 1	27 6	22 3	30 6
Iron	19500 B	17900 B	19100	15900	22000	17200	28800 B
Lead	11 5	9	16 3	11 8	12 4	10 1	14 7
Manganese	298 B	311 B	456	355	361	220	310 B
Nickel	31 2	24 2	26 4	23	37 1	26 5	49 6
Selenium	0 56 U	0 56 U	0 58 U	0 57 U	0 58 U	0 57 U	0 58 U
Thallium	0 97 J	1 1 U	0 89 J	1 1 U	1 2 U	1 1 U	1 4
Vanadium	21 5	20 2	20 3	21 1	18 5	18 9	26 6
Zinc	95 5 B	54 6 B	96 4 B	78 4 B	93 6 B	60 8 B	114 B
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0.038 J	0 04 J	0 044 J	0 041 J	0 044 J	0 037 J	0 054 J
Analyte	**Volatiles by SW8260 (ug/kg)**						
1,1,1-Trichloroethane	210 U	220 U	67 J	240	230	240 U	270 U
1,1-Dichloroethane	210 U	220 U	230 U	240 U	220 U	240 U	270 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples (Continued)
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0505N 2/16/99 14 - 16 ft bgs	282DP-0506N 2/16/99 16 - 17.5 ft bgs	282DP-0601N 2/18/99 0 - 4 ft bgs	282DP-0601D 2/18/99 0 - 4 ft bgs	282DP-0602N 2/18/99 4 - 8 ft bgs	282DP-0603N 2/18/99 8 - 11 ft bgs	282DP-0701N 2/17/99 0 - 4 ft bgs
cis-1,2-Dichloroethene	100 U	110 U	110 U	120 U	110 U	120 U	130 U
Trichloroethene	210 U	220 U	230 U	39 J	40 J	240 U	270 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0702N 2/17/99 4 - 8 ft bgs	282DP-0703N 2/17/99 8 - 12 ft bgs	282DP-0703D 2/17/99 8 - 12 ft bgs	282DP-0801N 2/17/99 0 - 4 ft bgs	282DP-0802N 2/17/99 4 - 8 ft bgs	282DP-0803N 2/17/99 8 - 12 ft bgs	282DP-0901N 2/17/99 0 - 4 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	10600	8070	11900	12900	10400	5530	17700
Arsenic	10 4	7 3	6 6	13	16 i	8 9	16 7
Barium	81 6	94 9	132	231	106	81 9	183
Beryllium	0 46 J	0 31 J	0 47 J	0 57 J	0 34 J	0 18 J	0 64
Cadmium	0 61 U	0 57 U	0 58 U	0 66 U	0 61 U	0 57 U	0 63 U
Chromium (Total)	14 5	11 6	15 1	15	15 6	8 9	20 2
Cobalt	7 5	8 4	9 6	7 1	14 7	8 8	12 4
Copper	29	18 8	17 7	26 2	29 2	21 7	27 3
Iron	25000 B	15300 B	15300 B	21500	27700	16000	28100
Lead	13 1	8 9	8 8	15 8	13 9	9 7	15
Manganese	200 B	259	450 B	204	248	254	611
Nickel	32 2	23 4	22 3	22 1	46 5	26 1	35 6
Selenium	0 61 U	0 78	0 58 U	0 98	0 61 U	0 57 U	0 63 U
Thallium	0.84 J	1 1 U	1 2 U	1 3 U	1 1 J	0 78 J	1 3 U
Vanadium	28 8	17	25	29 3	22 2	12 2	40 9
Zinc	101 B	58	60 8 B	93 6	96 6	65 1	95 5
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 051 J	0 039 J	0 037 J	0 069 J	0 052 J	0 034 J	0 085 J
Analyte	**Volatiles by SW8260 (ug/kg)**						
1,1,1-Trichloroethane	240 U	220 U	220 U	310 U	260 U	220 U	300 U
1,1-Dichloroethane	240 U	220 U	220 U	310 U	260 U	220 U	300 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples (Continued)
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0702N 2/17/99 4 - 8 ft bgs	282DP-0703N 2/17/99 8 - 12 ft bgs	282DP-0703D 2/17/99 8 - 12 ft bgs	282DP-0801N 2/17/99 0 - 4 ft bgs	282DP-0802N 2/17/99 4 - 8 ft bgs	282DP-0803N 2/17/99 8 - 12 ft bgs	282DP-0901N 2/17/99 0 - 4 ft bgs
cis-1,2-Dichloroethene	120 U	110 U	110 U	150 U	130 U	110 U	150 U
Trichloroethene	240 U	220 U	220 U	310 U	260 U	220 U	300 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0902N 2/17/99 4 - 8 ft bgs	282DP-0903N 2/17/99 8 - 12 ft bgs	282DP-0903D 2/17/99 8 - 12 ft bgs	282DP-1001N 2/17/99 0 - 4 ft bgs	282DP-1002N 2/17/99 4 - 8 ft bgs	282DP-1003N 2/17/99 8 - 11 ft bgs	282DP-1004N 2/17/99 14 - 16 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	9420	9550	6420	11100	9330	7300	9910
Arsenic	15 5	9 2	9 2	7 2	12 4	10 8	10 4
Barium	96 1	87 9 D	81 4	191	90 4	138	81 9
Beryllium	0 36 J	0 39 J	0 25 J	0 63 J	0 42 J	0 27 J	0 43 J
Cadmium	0 6 U	0 56 U	0 56 U	0 66 U	0 58 U	0 56 U	0 56 U
Chromium (Total)	13	12 7 D	10 2	13 5	13.7	10 4	13 4
Cobalt	12 2	8 4 D	8 7	7.5	9 7	10 2	8 5
Copper	24 3	20 4	21 3	25 9	25 4	21 4	22 3
Iron	21900	17900 D	17100	20700	19100	17500	19000
Lead	12 5	9 4 D	9 7	16 4	11 4	9 3	10
Manganese	486	205 D	215	341	349	418	332
Nickel	33 6	26 2 D	26 9	24 6	28 7	26 9	28 1
Selenium	0 6 U	0 56 U	0 56 U	0 66 U	0 58 U	0 56 U	0 56 U
Thallium	1 2 U	1 1 U	1 1 U	1 3 U	1 2 U	1 1 U	1 1 U
Vanadium	21.3	20 9 D	14 3	25.9	37	15 5	22 7
Zinc	70 2	65 7 D	69 4 B	87 2 B	64.1 B	66 7 B	78 6 B
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 045 J	0 035 J	0 036 J	0 09 J	0 045 J	0 039 J	0 037 J
Analyte	**Volatiles by SW8260 (ug/kg)**						
1,1,1-Trichloroethane	270 U	240 U	210 U	270 U	240 U	210 U	240 U
1,1-Dichloroethane	270 U	240 U	210 U	270 U	240 U	210 U	240 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples (Continued)
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-0902N 2/17/99 4 - 8 ft bgs	282DP-0903N 2/17/99 8 - 12 ft bgs	282DP-0903D 2/17/99 8 - 12 ft bgs	282DP-1001N 2/17/99 0 - 4 ft bgs	282DP-1002N 2/17/99 4 - 8 ft bgs	282DP-1003N 2/17/99 8 - 11 ft bgs	282DP-1004N 2/17/99 14 - 16 ft bgs
cis-1,2-Dichloroethene	130 U	120 U	100 U	140 U	120 U	100 U	120 U
Trichloroethene	270 U	240 U	210 U	270 U	240 U	210 U	240 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-1005N 2/17/99 18 - 19 ft bgs	282DP-1101N 2/17/99 0 - 4 ft bgs	282DP-1102N 2/17/99 4 - 8 ft bgs	282DP-1103N 2/17/99 8 - 12 ft bgs	282DP-1103D 2/17/99 8 - 12 ft bgs	282DP-1104N 2/17/99 12 - 15.5 ft bgs	282DP-1105N 2/17/99 15.5 - 17.5 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	5020	15800	10000	8070	10800	6350	5610
Arsenic	27 7	8 8	10 3	7 9	7 9	7 8	9 5
Barium	38 5	177	77 8	80 3	62 2	51 7	66 1
Beryllium	0 27 J	0 57 J	0 44 J	0 34 J	0 42 J	0 24 J	0 21 J
Cadmium	0 55 U	0 62 U	0 58 U	0 56 U	0 56 U	0 56 U	0 56 U
Chromium (Total)	8	17 6	13 8	11 5	13 7	9 5	8 6
Cobalt	6 5	6 8	7 8	7.6	8 4	7 6	7 1
Copper	26 2	20 2	24 5	21 4	22 3	22 1	19
Iron	15900	21300	18900	15500	17000	15600	13300
Lead	8 7	13 7	10 4	10 4	10 5	9	7 2
Manganese	265	320	358	164	176	301	229
Nickel	27 4	20 2	25 9	24 7	26 5	26.1	21 3
Selenium	0 55 U	0 62 U	0 58 U	0 56 U	0 56 U	0 56 U	0 56 U
Thallium	1.1 U	1 2 U	1 2 U	1 1 U	1 1 U	1 1 U	1 1 U
Vanadium	15 5	36 3	22 3	18 5	23 4	13 7	12 6
Zinc	75 7 B	98 7 B	64 2 B	66 6 B	66 9 B	67 1 B	54 9 B
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 038 J	0 072 J	0 034 J	0 037 J	0 036 J	0 037 J	0 033 J
Analyte	**Volatiles by SW8260 (ug/kg)**						
1,1,1-Trichloroethane	210 U	290 U	240 U	230 U	230 U	220 U	220 U
1,1-Dichloroethane	210 U	290 U	240 U	230 U	230 U	220 U	220 U
cis-1,2-Dichloroethene	110 U	150 U	120 U	110 U	110 U	110 U	110 U

Table 4.3-1

Summary of Analyte Concentrations for Soil Samples (Continued)
IWTP Process Water Tanks (282-282 A,B,C)

Sample ID Date Sampled Depth	282DP-1005N 2/17/99 18 - 19 ft bgs	282DP-1101N 2/17/99 0 - 4 ft bgs	282DP-1102N 2/17/99 4 - 8 ft bgs	282DP-1103N 2/17/99 8 - 12 ft bgs	282DP-1103D 2/17/99 8 - 12 ft bgs	282DP-1104N 2/17/99 12 - 15.5 ft bgs	282DP-1105N 2/17/99 15.5 - 17.5 ft bgs
Trichloroethene	210 U	290 U	240 U	230 U	230 U	220 U	220 U

Note: Sample IDs 282DP-0302D, 282DP-0303D, 282DP-0503D, 282DP-0601D, 282DP-0703D, 282DP-0903D and 282DP-1103D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.3-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
IWTP Process Water Tanks (282-282 A,B,C)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	21600
Arsenic	86 00	27 7
Barium	140000 00	231
Beryllium	30	0 69
Calcium	NA	102000
Cadmium	300 00	0 78
Cobalt	10000	15 4
Chromium (Total)	2800 00	24 3
Copper	70000	34 5
Iron	100000	29100
Potassium	NA	3840
Magnesium	NA	45400
Manganese	45000	723
Sodium	NA	211
Nickel	3700 00	49 6
Lead	2800	17 1
Selenium	10000 00	0 98
Thallium	160	1 4
Vanadium	14000	55 6
Zinc	370000 00	114

Table 4.3-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
IWTP Process Water Tanks (282-282 A,B,C)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Mercury by SW7471		
Mercury	230 00	0 09
Volatiles by SW8260		
1,1-Dichloroethane	2300 00	0 055
cis-1,2-Dichloroethene	1200 00	0 032
1,1,1-Trichloroethane	1400 00	0 52
Trichloroethene	330 00	0 051

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

4.3.4 Data Validation Summary

Forty-two soil samples and seven soil duplicates were collected at 282 tanks and were analyzed for VOCs and inorganics.

On the basis of concentrations detected in associated laboratory blanks, sodium results were qualified as non-detect for eight soil samples. Antimony, calcium and lead non-detect results were qualified R and rejected for twenty-five soil samples due to low percent recovery of matrix spikes and a high RPD between matrix spike and matrix spike duplicate results. More than 47% of the inorganic data points were estimated due to matrix interference and field duplicate precision.

All soil data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at 282-282 A, B, C:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	1715	0	100%	0.9%	0%
Inorganics	1127	25	97.8%	47.5%	0.6%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.3.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist in the soils at the IWTP tanks, no further action is recommended. The IWTP Process Tank site is recommended for Category 4 designation.

4.4 AUTOCLAVE PIT (3-AUTOCPIT)

The two autoclave pits are located in the southeast corner of Building 3. During the site visit in February of 1995 (Reference 160), the pits were observed to be blackened with grime.

4.4.1 Site Summary

No investigation has been conducted concerning the chemical constituents of the grime. 3-AUTOCPIT was designated as Category 7 in the EBS (Reference 213).

4.4.2 Field Activities Conducted

Five boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Sixteen direct push soil samples and two groundwater samples were collected at 3-AUTOCPIT and were analyzed for VOCs, SVOCs, PCBs, GRO, DRO, and inorganics. Two concrete wipe samples were collected and analyzed for PCBs. Also, a liquid grab sample was collected and analyzed for VOCs, SVOCs, PCBs, GRO, DRO and inorganics. Sample locations are shown in Figure 4.4-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

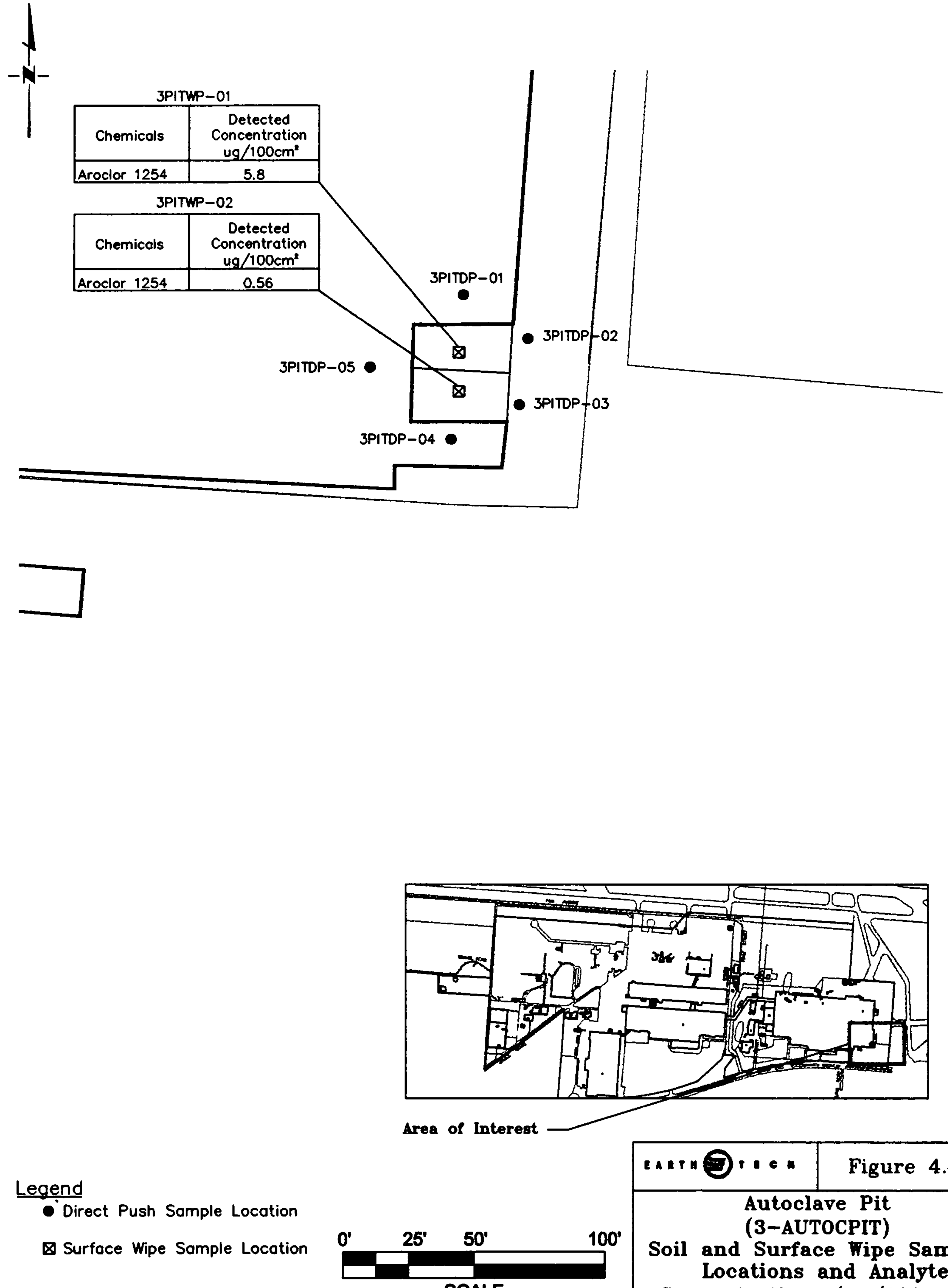
Number of Samples Collected at 3-AUTOCPIT				
Sampling Point	Soil(1)	Groundwater(2)	Sediment	Other(3,4)
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	16	2	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	1
Wipe Samples	--	--	--	2

(1) Soil analytical suite: Metals (SW3050/6010), volatile organic compounds (SW8260), diesel range organics and gasoline range organics (modified SW8015), PCBs (SW3550/8082), semivolatile compounds (SW5030/8270), and soil moisture (ASTM D2216)

(2) Groundwater analytical suite: Metals (filtered and unfiltered) (SW3005/6010), volatile organic compounds (SW8260), diesel range organics and gasoline range organics (modified SW8015), PCBs (SW8082), semivolatile compounds (SW3510/8270).

(3) Liquid grab sample analytical suite: Metals (SW3005/6010), volatile organic compounds (SW8260), diesel range organics and gasoline range organics (modified SW8015), PCBs (SW8082), semivolatile compounds (SW3510/8270).

(4) Wipe sample analytical suite: PCBs (SW3550/8082).



EARTH TECH

Figure 4.4-1

Autoclave Pit (3-AUTOCPIT) Soil and Surface Wipe Sample Locations and Analyte Concentrations ($ug/100cm^2$)

29179.4.1-5.DWG/PLT

4.4.3 Results

Numerous inorganics, VOCs, SVOCs and TPH were detected in the soil samples collected; the detections are summarized in Table 4.4-1. Aroclor-1254 was detected in the two soil samples collected at borehole 3PITDP-05. Table 4.4-2 presents a comparison between the maximum concentration detected and the adjusted VAP standard for each analyte. No concentrations exceeded the respective adjusted VAP soil standards.

During the Winter 99 investigation, five borings were advanced to either 12 feet or 16 feet bgs. The soils encountered were brown silty clay with gravel. No sample was collected at 3-AUTOCPIT for vertical conductivity determination. However, during previous investigations, the vertical conductivity of soils was determined for two other sites in the vicinity of 3-AUTOCPIT. These two sites are 3-DPSHOP and 3-SMPFAB3. The conductivity values were 3.11×10^{-6} cm/s and 3.49×10^{-6} cm/s, respectively. These values are typical of glacial till. Based on the shallow Groundwater encountered in the borings near Building 3 and the soils encountered beneath the 3-AUTOCPIT, leaching to groundwater is probable and will be investigated further in future investigations.

Numerous inorganics exceeding the VAP generic unrestricted potable use standards were detected in the two groundwater samples collected at 3-AUTOCPIT; concentrations and comparisons are presented in Table 4.4-3. The metals include cadmium, chromium, nickel and thallium. Figure 4.4-2 shows sample locations and elevated analyte concentrations.

DRO and GRO were not detected in the grab sample collected. However, arsenic, barium, chromium, iron, manganese, lead and zinc were detected. Aroclor-1254 was also detected in the grab sample. Concentrations are presented in Table 4.4-4, and Figure 4.4-2 shows the sample location and analyte concentrations. There is no OEPA standard or background standard for comparison to analytical results for the grab sample. However, a comparison to the City of Columbus sanitary sewer discharge limits was performed. This comparison showed the concentrations of the water in the pits are less than the discharge limits.

The two wipe samples collected from the walls of each pit contained Aroclor-1254. The data are presented in Table 4.4-5. Concentrations did not exceed the OEPA Industrial Cleanup Limit of 100 μg/100 cm^2.

4.4.4 Data Validation Summary

Eleven soil samples, two soil duplicates, two groundwater samples and one liquid grab sample were collected at 3-AUTOCPIT and were analyzed for VOCs, SVOCs, PCBs, TPH (GRO and DRO) and inorganics. Two wipe samples were also collected and analyzed for PCBs.

On the basis of concentrations detected in associated blanks, methylene chloride results were qualified as non-detect for five soil samples. Due to blank contamination, n-propylbenzene, m,p-xylene, tert-butylbenzene, sec-butylbenzene, p-isopropyltoluene and n-butylbenzene results were all qualified as non-detect in sample 3PITDP-0101N and 1,2-dichloroethane was qualified as non-detect in sample 3PITGW-02N.

Table 4.4-1

Summary of Analyte Concentrations for Soil Samples
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled Depth	3PITDP-0101N 2/23/99 4 - 8 ft bgs	3PITDP-0102N 2/23/99 8 - 12 ft bgs	3PITDP-0103N 2/23/99 12 - 16 ft bgs	3PITDP-0201N 2/23/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	10000	8200	6600	17000
Arsenic	9	16	14	28
Barium	110	84	220	130
Beryllium	0 62 U	0 59 U	0 56 U	0 96
Cadmium	0 62 U	0 63	0 61	0 69
Chromium (Total)	13	12	11	23
Cobalt	11	12	9 2	12
Copper	17	28	21	33
Iron	23000	29000	19000	48000
Lead	16	13	10	18
Manganese	690	330	310	240
Nickel	15	38	24	43
Selenium	0 49 U	0 64 S	0 62 S	0 64 S
Thallium	0 58 S	1 6 S	1 3 S	0 95 S
Vanadium	23	21	19	40
Zinc	69	110	60	120
Analyte	**Volatiles by SW8260 (ug/kg)**			
1,2-Dichlorobenzene	520 U	560 U	420 U	560 U
Acetone	540 J	650 J	480 J	670 J
Carbon Disulfide	520 U	560 U	420 U	560 U
Carbon Tetrachloride	520 U	560 U	420 U	560 U
Chlorobenzene	520 U	560 U	420 U	560 U

Table 4.4-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Autoclave Pit (3-AUTOCPIT)

Sample ID / Date Sampled / Depth	3PITDP-0101N / 2/23/99 / 4 - 8 ft bgs	3PITDP-0102N / 2/23/99 / 8 - 12 ft bgs	3PITDP-0103N / 2/23/99 / 12 - 16 ft bgs	3PITDP-0201N / 2/23/99 / 4 - 8 ft bgs
Ethylbenzene	520 U	560 U	420 U	560 U
Hexachlorobutadiene	520 U	560 U	420 U	560 U
m-Xylene	23 J	560 U	420 U	560 U
Methyl Ethyl Ketone	620 J	670 J	470 J	690 J
Methylene Chloride	52 J	59 J	33 J	54 J
n-Butylbenzene	50 J	560 U	420 U	560 U
n-Propylbenzene	20 J	560 U	420 U	560 U
o-Xylene	520 U	560 U	420 U	560 U
p-Cymene	41 J	560 U	420 U	560 U
sec-Butylbenzene	42 J	560 U	420 U	560 U
t-Butylbenzene	24 J	560 U	420 U	560 U
Tetrachloroethene	520 U	560 U	420 U	560 U
Toluene	520 U	140 J	420 U	17 J
Trichloroethene	520 U	560 U	420 U	560 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
1,2-Dichlorobenzene	200 U	190 U	180 U	220 U
Anthracene	200 U	190 U	180 U	220 U
Benzo(a)anthracene	200 U	190 U	180 U	220 U
Benzo(a)pyrene	200 U	190 U	180 U	220 U
Benzo(b)fluoranthene	200 U	190 U	180 U	220 U
Benzo(g,h,i)perylene	200 U	190 U	180 U	220 U
Benzo(k)fluoranthene	200 U	190 U	180 U	220 U
bis(2-Ethylhexyl)phthalate	200 U	97	140	220 U

Table 4.4-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled Depth	3PITDP-0101N 2/23/99 4 - 8 ft bgs	3PITDP-0102N 2/23/99 8 - 12 ft bgs	3PITDP-0103N 2/23/99 12 - 16 ft bgs	3PITDP-0201N 2/23/99 4 - 8 ft bgs
Chrysene	200 U	190 U	180 U	220 U
Fluoranthene	200 U	190 U	180 U	220 U
Hexachlorobutadiene	200 U	190 U	180 U	220 U
Indeno(1,2,3-c,d)pyrene	200 U	190 U	180 U	220 U
Phenanthrene	200 U	190 U	180 U	220 U
Pyrene	200 U	190 U	180 U	220 U
Analyte	**PCBs by SW8080 (ug/kg)**			
Aroclor 1254	20 U	19 U	18 U	22 U
Analyte	**TPH by M8015D (ug/kg)**			
PHC as Gasoline	120 U	120 U	110 U	130 U
PHC C16-C32	22000	19000	71000	5300 U

Table 4.4-1

Summary of Analyte Concentrations for Soil Samples
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled Depth	3PITDP-0202N 2/23/99 8 - 12 ft bgs	3PITDP-0202D 2/23/99 8 - 12 ft bgs	3PITDP-0301N 2/23/99 4 - 8 ft bgs	3PITDP-0302N 2/23/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	8300	10000	22000	5500
Arsenic	10	15	7 9	17
Barium	170	110	180	44
Beryllium	0 58 U	0 64	1	0 55 U
Cadmium	0 94	1 2	0 73	0 71
Chromium (Total)	12	15	26	8
Cobalt	12	15	11	7 4
Copper	21	33	35	24
Iron	18000	38000	27000	24000
Lead	13	15	18	14
Manganese	690	430	170	170
Nickel	26	44	41	26
Selenium	1 2 U	1 2 U	0 64 S	1 4 S
Thallium	0 97 S	1 1 S	0 61 S	0 76 S
Vanadium	22	39	44	20
Zinc	65	120	100	99
Analyte	**Volatiles by SW8260 (ug/kg)**			
1,2-Dichlorobenzene	520 U	520 U	580 U	21 J
Acetone	590 J	600 J	720 J	520 J
Carbon Disulfide	520 U	520 U	580 U	20 J
Carbon Tetrachloride	520 U	520 U	580 U	25 J
Chlorobenzene	520 U	520 U	580 U	18 J

Table 4.4-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled Depth	3PITDP-0202N 2/23/99 8 - 12 ft bgs	3PITDP-0202D 2/23/99 8 - 12 ft bgs	3PITDP-0301N 2/23/99 4 - 8 ft bgs	3PITDP-0302N 2/23/99 8 - 12 ft bgs
Ethylbenzene	520 U	520 U	580 U	26 J
Hexachlorobutadiene	520 U	520 U	580 U	32 J
m-Xylene	520 U	520 U	22 J	52 J
Methyl Ethyl Ketone	650 J	640 J	770 J	550 J
Methylene Chloride	520 U	53 J	57 J	440 U
n-Butylbenzene	520 U	520 U	580 U	440 U
n-Propylbenzene	520 U	520 U	580 U	440 U
o-Xylene	520 U	520 U	580 U	21 J
p-Cymene	520 U	520 U	580 U	440 U
sec-Butylbenzene	520 U	520 U	580 U	440 U
t-Butylbenzene	520 U	520 U	580 U	440 U
Tetrachloroethene	520 U	520 U	580 U	36 J
Toluene	520 U	520 U	17 J	440 U
Trichloroethene	520 U	520 U	580 U	25 J
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
1,2-Dichlorobenzene	190 U	200 U	210 U	180 U
Anthracene	190 U	200 U	210 U	92 J
Benzo(a)anthracene	190 U	200 U	210 U	240
Benzo(a)pyrene	190 U	200 U	210 U	200
Benzo(b)fluoranthene	190 U	200 U	210 U	150 J
Benzo(g,h,i)perylene	190 U	200 U	210 U	77 J
Benzo(k)fluoranthene	190 U	200 U	210 U	160 J
bis(2-Ethylhexyl)phthalate	190 U	200 U	210 U	180 U

Table 4.4-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled Depth	3PITDP-0202N 2/23/99 8 - 12 ft bgs	3PITDP-0202D 2/23/99 8 - 12 ft bgs	3PITDP-0301N 2/23/99 4 - 8 ft bgs	3PITDP-0302N 2/23/99 8 - 12 ft bgs
Chrysene	190 U	200 U	210 U	240
Fluoranthene	190 U	200 U	210 U	600
Hexachlorobutadiene	190 U	200 U	210 U	180 U
Indeno(1,2,3-c,d)pyrene	190 U	200 U	210 U	110 J
Phenanthrene	190 U	200 U	210 U	360
Pyrene	190 U	200 U	210 U	430
Analyte	**PCBs by SW8080 (ug/kg)**			
Aroclor 1254	19 U	20 U	21 U	18 U
Analyte	**TPH by M8015D (ug/kg)**			
PHC as Gasoline	120 U	44 J	130 U	110 U
PHC C16-C32	7100	7000 J	5200 U	7200 J

Table 4.4-1

Summary of Analyte Concentrations for Soil Samples
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled Depth	3PITDP-0401N 2/22/99 4 - 8 ft bgs	3PITDP-0401D 2/22/99 4 - 8 ft bgs	3PITDP-0402N 2/22/99 8 - 12 ft bgs	3PITDP-0501N 2/23/99 4 - 8 ft bgs	3PITDP-0502N 2/23/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**				
Aluminum	16000	17000	14000	19000	7200
Arsenic	15	16	17	5 9	8 8
Barium	210	180	110	250	71
Beryllium	1 2	0 91	0 79	1 2	0 58 U
Cadmium	0 76	0 82	0 63 U	0 81	1 2
Chromium (Total)	21	24	19	24	11
Cobalt	28	19	10	13	10
Copper	54	33	40	44	32
Iron	78000	43000	29000	42000	28000
Lead	18	15	16	16	11
Manganese	310	300	130	170	270
Nickel	69	55	35	40	36
Selenium	0 51 U	0 51 U	0 84 S	0 73 S	1 1 S
Thallium	1 6 U	0 79 S	1 3 S	0 64 S	1 3 S
Vanadium	38	30	28	43	23
Zinc	100	93	84	100	97
Analyte	**Volatiles by SW8260 (ug/kg)**				
1,2-Dichlorobenzene	570 U	580 U	600 U	620 U	490 U
Acetone	620 J	620 J	670 J	650 J	510 J
Carbon Disulfide	570 U	580 U	600 U	620 U	490 U
Carbon Tetrachloride	570 U	580 U	600 U	620 U	490 U
Chlorobenzene	570 U	580 U	600 U	620 U	490 U
Ethylbenzene	570 U	580 U	600 U	620 U	490 U

Table 4.4-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled Depth	3PITDP-0401N 2/22/99 4 - 8 ft bgs	3PITDP-0401D 2/22/99 4 - 8 ft bgs	3PITDP-0402N 2/22/99 8 - 12 ft bgs	3PITDP-0501N 2/23/99 4 - 8 ft bgs	3PITDP-0502N 2/23/99 8 - 12 ft bgs
Hexachlorobutadiene	570 U	580 U	600 U	620 U	490 U
m-Xylene	570 U	580 U	600 U	620 U	490 U
Methyl Ethyl Ketone	820 J	760 J	830 J	880 J	730 J
Methylene Chloride	37 J	47 J	600 U	54 J	33 J
n-Butylbenzene	570 U	580 U	600 U	620 U	490 U
n-Propylbenzene	570 U	580 U	600 U	620 U	490 U
o-Xylene	570 U	580 U	600 U	620 U	490 U
p-Cymene	570 U	580 U	600 U	620 U	490 U
sec-Butylbenzene	570 U	580 U	600 U	620 U	490 U
t-Butylbenzene	570 U	580 U	600 U	620 U	490 U
Tetrachloroethene	570 U	580 U	600 U	620 U	490 U
Toluene	32 J	26 J	120 J	23 J	15 J
Trichloroethene	570 U	580 U	600 U	620 U	490 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
1,2-Dichlorobenzene	210 U	210 U	210 U	210 U	190 U
Anthracene	210 U	210 U	210 U	210 U	190 U
Benzo(a)anthracene	210 U	210 U	210 U	210 U	190 U
Benzo(a)pyrene	210 U	210 U	210 U	210 U	190 U
Benzo(b)fluoranthene	210 U	210 U	210 U	210 U	190 U
Benzo(g,h,i)perylene	210 U	210 U	210 U	210 U	190 U
Benzo(k)fluoranthene	210 U	210 U	210 U	210 U	190 U
bis(2-Ethylhexyl)phthalate	76	100	80	71	75
Chrysene	210 U	210 U	210 U	210 U	190 U

Table 4.4-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled Depth	3PITDP-0401N 2/22/99 4 - 8 ft bgs	3PITDP-0401D 2/22/99 4 - 8 ft bgs	3PITDP-0402N 2/22/99 8 - 12 ft bgs	3PITDP-0501N 2/23/99 4 - 8 ft bgs	3PITDP-0502N 2/23/99 8 - 12 ft bgs
Fluoranthene	210 U	210 U	210 U	210 U	190 U
Hexachlorobutadiene	210 U	210 U	210 U	210 U	190 U
Indeno(1,2,3-c,d)pyrene	210 U	210 U	210 U	210 U	190 U
Phenanthrene	210 U	210 U	210 U	210 U	190 U
Pyrene	210 U	210 U	210 U	210 U	190 U
Analyte	**PCBs by SW8080 (ug/kg)**				
Aroclor 1254	21 U	21 U	21 U	25	31
Analyte	**TPH by M8015D (ug/kg)**				
PHC as Gasoline	130 U	130 U	130 U	130 U	120 U
PHC C16-C32	9200 J	5200 J	10000 J	5800 J	19000

Note: Sample IDs 3PITDP-0202D and 3PITDP-0401D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.4-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Autoclave Pit (3-AUTOCPIT)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	22000
Arsenic	86 00	28
Barium	140000 00	250
Beryllium	30	1 2
Calcium	NA	110000
Cadmium	300 00	1.2
Cobalt	10000	28
Chromium (Total)	2800 00	26
Copper	70000	54
Iron	100000	78000
Potassium	NA	2600
Magnesium	NA	37000
Manganese	45000	690
Sodium	NA	160
Nickel	3700 00	69
Lead	2800	18
Selenium	10000 00	1 4
Thallium	160	1 6
Vanadium	14000	44
Zinc	370000 00	120

Table 4.4-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Autoclave Pit (3-AUTOCPIT)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
Volatiles by SW8260		
Acetone	55000 00	0 72
n-Butylbenzene	250	0 05
sec-Butylbenzene	NA	0 042
t-Butylbenzene	NA	0 024
Toluene	520 00	0 14
Carbon Disulfide	720	0 02
Chlorobenzene	180	0 018
Carbon Tetrachloride	15 00	0 025
p-Cymene	NA	0 041
1,2-Dichlorobenzene	370	0 021
Ethylbenzene	230 00	0 026
Hexachlorobutadiene	38	0 032
Methyl Ethyl Ketone	27000 00	0 88
Methylene Chloride	990 00	0 059
n-Propylbenzene	NA	0 02
Tetrachloroethene	370 00	0 036
Trichloroethene	330 00	0.025
m-Xylene	NA	0 052
o-Xylene	NA	0 021
Semivolatiles by SW8270		

Table 4.4-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Autoclave Pit (3-AUTOCPIT)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Anthracene	91000 00	0 092
bis(2-Ethylhexyl)phthalate	860 00	0 14
Benzo(a)anthracene	31 00	0 24
Benzo(a)pyrene	3 10	0 2
Benzo(b)fluoranthene	31 00	0 15
Benzo(g,h,i)perylene	9100 00	0 077
Benzo(k)fluoranthene	310 00	0 16
Chrysene	3100 00	0 24
Fluoranthene	12000 00	0 6
Indeno(1,2,3-c,d)pyrene	31 00	0 11
Phenanthrene	91000 00	0 36
Pyrene	9100 00	0 43
PCBs by SW8080		
Aroclor 1254	25	0 031
TPH by M8015D		
PHC C16-C32	40000	71
PHC as Gasoline	8000	0 044

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable. A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Table 4.4-3

Summary of Analyte Concentrations for Groundwater Samples
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	3PITGW-02N 2/23/99	3PITGW-03N 2/23/99
Analyte	**Inorganics (Total) by SW6010 (ug/L)**		
Aluminum	NA	78000	25000
Arsenic	NA	9 5	12
Barium	2000	640	370
Cadmium	5	43	10 U
Chromium (Total)	100	130	37
Cobalt	NA	61	30
Copper	NA	360	92
Iron	NA	160000	75000
Lead	NA	140	27
Manganese	NA	4000	1600
Nickel	100	250	110
Thallium	2	6.8	5 U
Vanadium	NA	290	91
Zinc	4700	750	370
Analyte	**Volatiles by SW8260 (ug/L)**		
1,2-Dichloroethane	5	0 29 J	5 U
Acetone	NA	100 U	4 5 J
Chlorobenzene	NA	5 U	5 U
Analyte	**Semivolatiles by SW8270 (ug/L)**		
Diethylphthalate	NA	1 3 J	12 U
Fluoranthene	NA	12 U	2 2 J

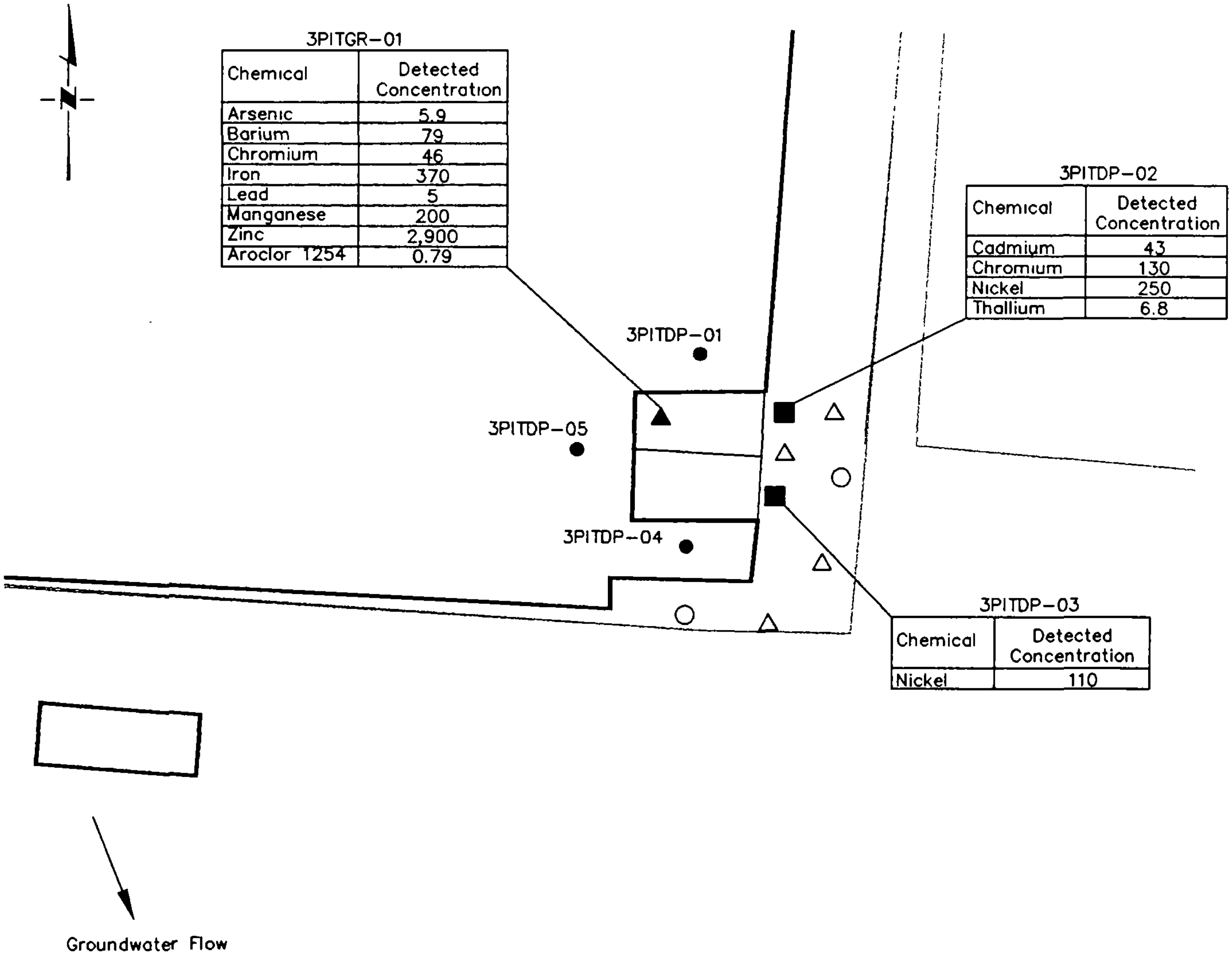
Table 4.4-3

Summary of Analyte Concentrations for Groundwater Samples (Continued)
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	3PITGW-02N 2/23/99	3PITGW-03N 2/23/99
Phenanthrene	NA	12 U	1 3 J
Pyrene	NA	12 U	1 9 J
Analyte	**TPH by M8015 (ug/L)**		
PHC C16-C32	NA	310 J	570 U

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:
J = Estimated
NA = Not available
U = Not detected
ug/L = Micrograms per Liter



3PITGR-01

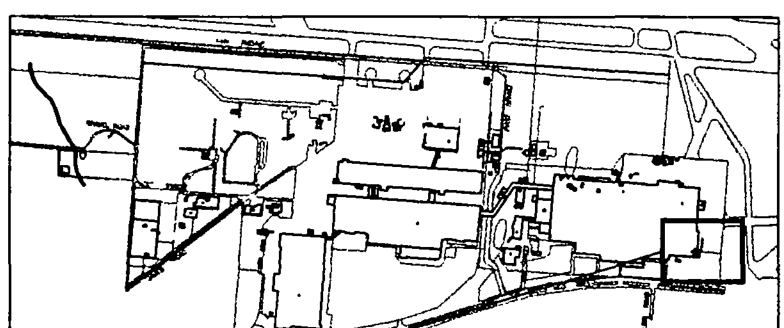
Chemical	Detected Concentration
Arsenic	5.9
Barium	79
Chromium	46
Iron	370
Lead	5
Manganese	200
Zinc	2,900
Aroclor 1254	0.79

3PITDP-02

Chemical	Detected Concentration
Cadmium	43
Chromium	130
Nickel	250
Thallium	6.8

3PITDP-03

Chemical	Detected Concentration
Nickel	110



Area of Interest

Legend
- ● Direct Push Sample Location
- ▲ Liquid Grab Sample Location
- ■ Groundwater Sample Location
- △ Proposed Borehole Location
- ○ Proposed Well Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.4-2

Autoclave Pit
(3-AUTOCPIT)
Groundwater and Liquid Grab Sample Locations and Analyte Concentrations (ug/L)

29179.4.1-5.DWG/PLT

Table 4.4-4

Summary of Analyte Concentrations for Grab Samples
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled	3PITGR-01N 2/17/99
Analyte	**Inorganics by SW6010 (ug/l)**
Arsenic	5 9
Barium	79
Chromium (Total)	46
Iron	370
Lead	5
Manganese	200
Zinc	2900
Analyte	**Volatiles by SW8260 (ug/l)**
Chlorobenzene	5 U
Analyte	**PCBs by SW8080 (ug/l)**
Aroclor 1254	0 79

Key: U = Not detected
ug/L = Micrograms per Liter

Table 4.4-5

Summary of Analyte Concentrations for Wipe Samples
Autoclave Pit (3-AUTOCPIT)

Sample ID Date Sampled	OEPA Industrial Cleanup Limit for PCBs (ug/100 cm2)	3PITWP-01N 2/17/99	3PITWP-02N 2/17/99
Chemical	**PCBs by SW8081 (ug/100cm2)**		
Aroclor 1254	100	5 8	0 56 *J*

Notes: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the Ohio EPA Industrial Limit for PCBs of 100 ug/100 cm2

Key:
J = Estimated
ug/100cm2 = Micrograms per 100 square centimeters

More than 53% of the TPH (GRO and DRO) data points for soil samples were estimated due to low percent recovery of matrix and surrogate spikes.

All soil, groundwater, liquid grab and wipe data points are useable. The following provides a summary of data validation results for samples collected at 3-AUTOCPIT:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	884	0	100%	12.4%	1.2%
SVOCs	858	0	100%	4.0%	0%
PCBs	91	0	100%	0%	0%
TPH (GRO and DRO)	26	0	100%	53.9%	0%
Inorganics	286	0	100%	20.3%	0%
Groundwater					
VOCs	136	0	100%	0.7%	0.7%
SVOCs	132	0	100%	3.0%	0%
PCBs	14	0	100%	0%	0%
TPH (GRO and DRO)	4	0	100%	25%	0%
Inorganics	44	0	100%	4.5%	0%
Liquid Grab					
VOCs	68	0	100%	0%	0%
SVOCs	66	0	100%	0%	0%
PCBs	7	0	100%	0%	0%
TPH (GRO and DRO)	2	0	100%	0%	0%
Inorganics	22	0	100%	0%	0%
Wipe					
PCBs	14	0	100%	7.1%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.4.5 Recommendations for Further Action

As discussed in Section 4.4.3, cadmium, chromium, nickel and thallium were detected in groundwater at concentrations that exceeded VAP generic unrestricted potable use standards.

In accordance with OAC 3745-300-07(D)(2), complete pathways must be determined for 3-AUTOCPIT. The potentially complete pathway is exposure to groundwater containing chemicals of concern. On-site or off-site receptors may be exposed to groundwater in the following ways:

- Ingestion of chemicals of concern if groundwater is used as a drinking water source.
- Dermal contact with chemicals of concern if groundwater is used for bathing/showering or is contacted incidentally during other potable or process use by receptors.

To determine whether contaminants in soil are leaching to groundwater, additional soil and groundwater sampling is recommended in the vicinity of the elevated inorganics hits. Two boreholes are recommended within a 10-foot radius of each of the contaminated sample locations (3PITDP-02, 3PITDP-03) for a total of four boreholes. Boreholes will be drilled to groundwater, samples will be collected every 5 feet, and groundwater will be sampled. Samples will be analyzed for cadmium, chromium (total), nickel, and thallium. Proposed sample locations are shown in Figure 4.4-2. In addition, a well should be installed 10 feet downgradient of each of the contaminated sample locations for a total of two wells.

If groundwater sampling analytical results indicate chemicals of concern exceed the unrestricted potable use standards, there are two choices. The first choice is to use institutional or engineering controls to prevent human exposure to chemicals of concern or to remediate groundwater. The second choice is to classify the groundwater. On the basis of groundwater classification, a different set of cleanup requirements will be determined.

The additional groundwater sampling will determine the horizontal and vertical extent of contamination. On the basis of this determination, either a baseline risk assessment or further sampling will be conducted.

Based on field observations and analytical results, the following is recommended if the owner or appropriate regulatory authority determines that any remaining liquid contained in the autoclave pit is solid waste: pump any remaining liquid out of the autoclave pit, and dispose of it in accordance with applicable regulations.

3-AUTOCPIT is designated Category 7.

4.5 THERMODYNAMICS LAB 271 (271-ACVPIT)

An underground sump is located outside near the center of the north face of Building 271, the thermodynamics laboratory. This sump is located beneath a thermal test cell used for materials testing. The sump was observed to contain dirty water during two site visits (Reference 193, 228). No oil sheen was noted. Signs near the pit warn of trichloroethylene (TCE) vapors.

4.5.1 Site Summary

No investigations as to the contents of the water have been conducted. 271-ACVPIT was designated Category 7 in the EBS (Reference 213).

4.5.2 Field Activities Conducted

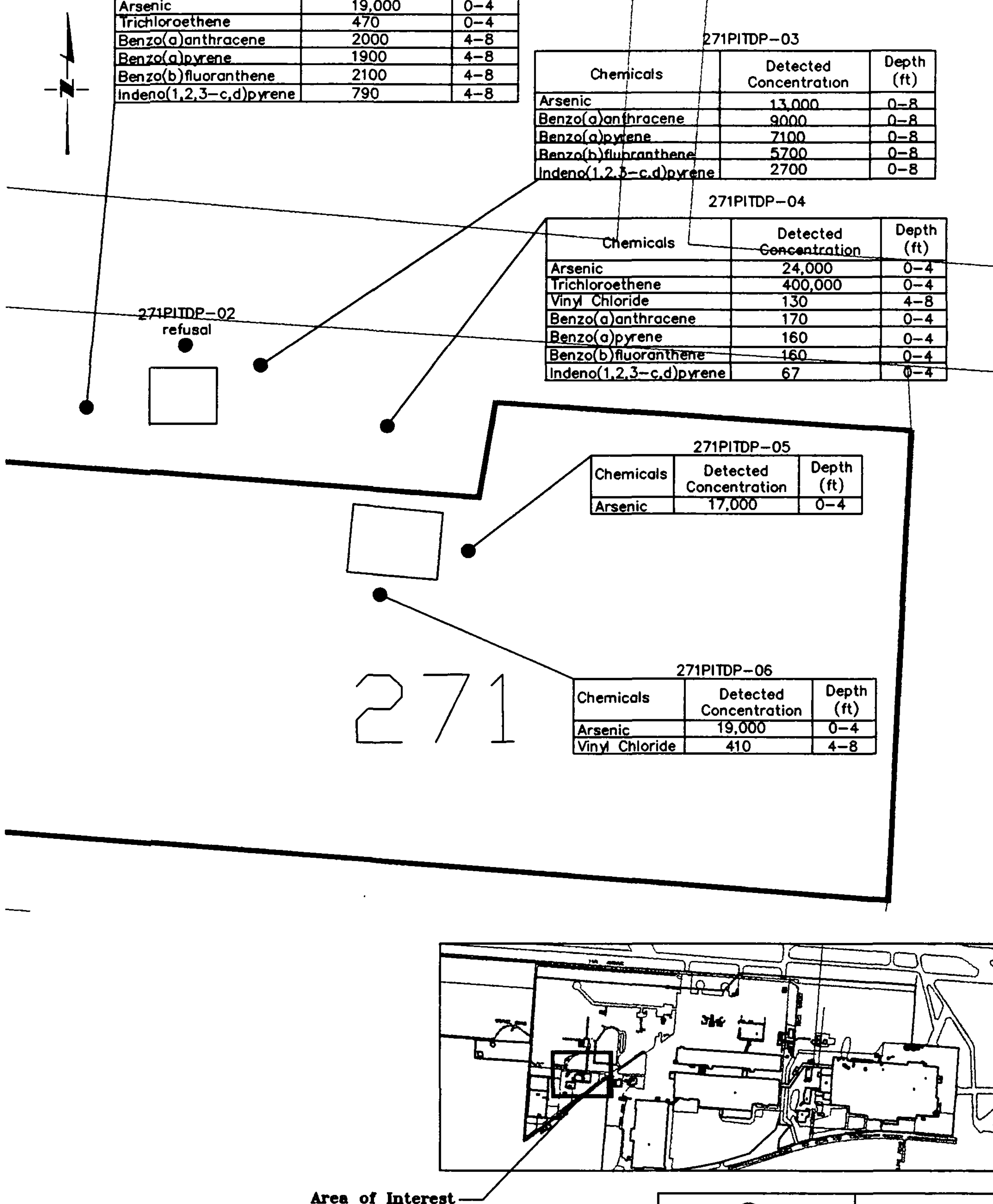
Six boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Eleven direct push soil samples and one groundwater sample were collected at 271-ACVPIT and were analyzed for VOCs, SVOCs, PCBs, GRO, DRO and inorganics. A sample was collected for vertical conductivity determination. Also, one liquid grab sample was collected and analyzed for VOCs, SVOCs, PCBs, GRO, DRO and inorganics. Sample locations are shown in Figure 4.5-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at 271-ACVPIT				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other(3)
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	11	1	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	1
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Metals (SW3050/6010), volatile organic compounds (SW8260), semivolatile organic compounds (SW8270), diesel range organics, gasoline range organics (modified SW8015), PCBs (SW8082), soil moisture (ASTM D2216), and vertical conductivity.

(2) Groundwater analytical suite: Metals (SW3005/6010), volatile organic compounds (SW8260), semivolatile organic compounds (SW8270), diesel range organics, gasoline range organics (modified SW8015), and PCBs (SW8082).

(3) Sump water analytical suite: Metals (SW3005/6010), volatile organic compounds (SW8260), diesel range organics, gasoline range organics (modified SW8015), PCBs (SW8082), and semivolatile organic compounds (SW3510/SW8270).



271PITDP-01

Chemicals	Detected Concentration	Depth (ft)
Arsenic	19,000	0-4
Trichloroethene	470	0-4
Benzo(a)anthracene	2000	4-8
Benzo(a)pyrene	1900	4-8
Benzo(b)fluoranthene	2100	4-8
Indeno(1,2,3-c,d)pyrene	790	4-8

271PITDP-03

Chemicals	Detected Concentration	Depth (ft)
Arsenic	13,000	0-8
Benzo(a)anthracene	9000	0-8
Benzo(a)pyrene	7100	0-8
Benzo(b)fluoranthene	5700	0-8
Indeno(1,2,3-c,d)pyrene	2700	0-8

271PITDP-04

Chemicals	Detected Concentration	Depth (ft)
Arsenic	24,000	0-4
Trichloroethene	400,000	0-4
Vinyl Chloride	130	4-8
Benzo(a)anthracene	170	0-4
Benzo(a)pyrene	160	0-4
Benzo(b)fluoranthene	160	0-4
Indeno(1,2,3-c,d)pyrene	67	0-4

271PITDP-05

Chemicals	Detected Concentration	Depth (ft)
Arsenic	17,000	0-4

271PITDP-06

Chemicals	Detected Concentration	Depth (ft)
Arsenic	19,000	0-4
Vinyl Chloride	410	4-8

EARTH TECH

Figure 4.5-1

Thermodynamics Lab 271 (271-ACVPIT) Soil Sample Locations and Analyte Concentrations (ug/kg)

29179.4.1-5.DWG/PLT

4.5.3 Results

Numerous inorganics, VOCs, SVOCs and TPH were detected in soil samples collected at 271-ACVPIT; Aroclor-1260 was detected in one of the six boreholes. The concentrations are presented in Table 4.5-1. Table 4.5-2 presents a comparison between the maximum concentration and the adjusted VAP standard for each detected analyte. Arsenic, TCE, vinyl chloride, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene were detected at concentrations exceeding the adjusted VAP standards. These exceedances were observed in five of the boreholes. Figure 4.5-1 shows the locations and concentrations. Soils encountered were brownish clay with trace silt and gravel. A vertical conductivity value of 1.6×10^{-7} cm/s was reported for the sample 271PITVP-05 collected at 9.5-10.5 feet bgs. This it typical of glacial till unconsolidated deposits. Based on the observed clay content of soils encountered within the 271-ACVPIT borings, and the low conductivity, the potential for contaminant leaching to groundwater is limited.

Inorganics, VOCs, SVOCs and TPH were detected in the groundwater sample collected at 271-ACVPIT; concentrations are presented in Table 4.5-3. Barium, cadmium, chromium, nickel, thallium, benzene, trichloroethene and vinyl chloride were detected at concentrations exceeding the VAP generic unrestricted potable use standard. Figure 4.5-2 shows the location of the elevated concentrations.

Numerous inorganics, VOCs and TPH were detected in the liquid grab sample collected at 271-ACVPIT; concentrations are presented in Table 4.5-4. There is no OEPA standard or background standard for comparison to analytical results for the grab sample. However, the concentration of TCE, 190 µg/L, exceeds the VAP generic unrestricted potable use standard.

4.5.4 Data Validation Summary

Eleven soil samples, two soil duplicates, one groundwater sample and one liquid grab sample were collected at 271-ACVPIT and were analyzed for VOCs, SVOCs, PCBs, TPH (GRO and DRO) and inorganics.

On the basis of concentrations detected in associated blanks, methylene chloride results were qualified as non-detect for six soil samples, acetone results for seven soil samples, toluene results for one soil sample (271PITDP-0602N), n-hexane results for one groundwater sample (271PITGW-01N) and hexachlorobutadiene results for one soil sample (271PITDP-0601N). Methylene chloride, trans-1,2-dichloroethene and 1,2-dichloroethane were detected in associated blanks, therefore, results in the grab sample (271PITGR-01N) were qualified as non-detect.

More than 65% of the TPH (GRO and DRO) data points for soil samples were estimated due to low percent recovery of matrix and surrogate spikes.

Non-detect results for antimony were qualified R and rejected for thirteen soil samples due to low percent recovery of matrix spikes and a high RPD between matrix spike and matrix spike duplicate results.

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled Depth	271PITDP-0101N 2/23/99 0 - 4 ft bgs	271PITDP-0102N 2/23/99 4 - 8 ft bgs	271PITDP-0301N 2/24/99 0 - 8 ft bgs	271PITDP-0302N 2/24/99 8 - 11 ft bgs	271PITDP-0302D 2/24/99 8 - 11 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**				
Aluminum	13000	18000	12000	15000	15000
Arsenic	19	18	13	8 2	13
Barium	89	100	84	120	130
Beryllium	0 68	0 72	0 59	0.79	0 76
Chromium (Total)	17	20	15	20	19
Cobalt	15	12	11	12	17
Copper	32	27	26	29	28
Iron	39000	39000	32000	31000	34000
Lead	20	15	18	18	20
Manganese	370	200	320	210	370
Nickel	35	26	27	30	31
Selenium	0 69 S	0 48 S	0 87 S	0 29 S	0 33 S
Thallium	0 8 S	0 56 S	0 8 S	0 69 S	0 61 S
Vanadium	31	39	29	35	34
Zinc	97	90	98	110	110
Analyte	**Volatiles by SW8260 (ug/kg)**				
1,1-Dichloroethene	520 U	540 U	500 U	540 U	500 U
1,2,4-Trimethylbenzene	520 U	540 U	500 U	540 U	500 U
1,3,5-Trimethylbenzene	520 U	540 U	500 U	540 U	500 U
Acetone	520 J	500 J	590 J	610 J	500 J
Bromomethane	1000 U	1100 U	1000 U	1100 U	1000 U
Chlorobenzene	520 U	540 U	500 U	540 U	500 U

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled Depth	271PITDP-0101N 2/23/99 0 - 4 ft bgs	271PITDP-0102N 2/23/99 4 - 8 ft bgs	271PITDP-0301N 2/24/99 0 - 8 ft bgs	271PITDP-0302N 2/24/99 8 - 11 ft bgs	271PITDP-0302D 2/24/99 8 - 11 ft bgs
Chloromethane	1000 U	1100 U	1000 U	1100 U	1000 U
cis-1,2-Dichloroethene	42 J	250 J	23 J	540 U	500 U
Ethylbenzene	520 U	540 U	500 U	540 U	500 U
Hexachlorobutadiene	520 U	540 U	500 U	540 U	500 U
m-Xylene	520 U	540 U	500 U	540 U	500 U
Methyl Ethyl Ketone	570 J	560 J	610 J	700 J	570 J
Methylene Chloride	520 U	540 U	35 J	540 U	500 U
n-Butylbenzene	30 J	540 U	500 U	540 U	500 U
Naphthalene	38 J	1100 U	1000 U	1100 U	1000 U
o-Xylene	520 U	540 U	500 U	540 U	500 U
Tetrachloroethene	520 U	540 U	500 U	540 U	500 U
Toluene	520 U	540 U	500 U	540 U	500 U
trans-1,2-Dichloroethene	520 U	93 J	500 U	540 U	500 U
Trichloroethene	470 J	450 J	84 J	540 U	500 U
Vinyl Chloride	210 U	220 U	200 U	220 U	200 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
2-Methylnaphthalene	200 U	320	220	380	190 J
Acenaphthene	200 U	1800	480	210 U	210 U
Acenaphthylene	200 U	210 U	1000	210 U	210 U
Anthracene	200 U	1600	4600	210 U	210 U
Benzo(a)anthracene	200 U	2000	9000	210 U	210 U
Benzo(a)pyrene	200 U	1900	7100	210 U	210 U
Benzo(b)fluoranthene	200 U	2100	5700	210 U	210 U

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled Depth	271PITDP-0101N 2/23/99 0 - 4 ft bgs	271PITDP-0102N 2/23/99 4 - 8 ft bgs	271PITDP-0301N 2/24/99 0 - 8 ft bgs	271PITDP-0302N 2/24/99 8 - 11 ft bgs	271PITDP-0302D 2/24/99 8 - 11 ft bgs
Benzo(g,h,i)perylene	200 U	780	2600	210 U	210 U
Benzo(k)fluoranthene	200 U	1800	6100	210 U	210 U
bis(2-Ethylhexyl)phthalate	89 J	140 J	190 U	210 U	100 J
Chrysene	200 U	2200	8200	210 U	210 U
Dibenzofuran	200 U	210 U	840	210 U	210 U
Fluoranthene	89 J	210 U	18000	210 U	210 U
Fluorene	200 U	1500	1800	210 U	210 U
Hexachlorobutadiene	200 U	210 U	190 U	210 U	210 U
Indeno(1,2,3-c,d)pyrene	200 U	790	2700	210 U	210 U
Naphthalene	200 U	210 U	180 J	210 U	210 U
Phenanthrene	63 J	210 U	16000	210 U	210 U
Pyrene	74 J	4600	15000	210 U	210 U
Analyte	**PCBs by SW8080 (ug/kg)**				
Aroclor 1260	20 U	20 J	19 U	21 U	21 U
Analyte	**TPH by M8015D (ug/kg)**				
PHC as Gasoline	490	230	120 U	130 U	130 U
PHC C16-C32	38000	790000	9200 J	33000	23000

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled Depth	271PITDP-0401N 2/24/99 0 - 4 ft bgs	271PITDP-0401D 2/24/99 0 - 4 ft bgs	271PITDP-0402N 2/24/99 4 - 8 ft bgs	271PITDP-0501N 2/24/99 0 - 4 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	24000	18000	16000	12000
Arsenic	24	14	20	17
Barium	62	83	100	100
Beryllium	0 77	0 6 U	0 97	0 66
Chromium (Total)	27	21	20	14
Cobalt	12	10	21	13
Copper	33	24	37	30
Iron	59000	34000	54000	36000
Lead	17	18	18	12
Manganese	140	180	340	340
Nickel	26	24	43	32
Selenium	0 71 S	0 5	0 49 U	0 48 S
Thallium	0 53 S	0 62 S	0.63 S	0 69 S
Vanadium	50	38	36	33
Zinc	90	84	120	93
Analyte	**Volatiles by SW8260 (ug/kg)**			
1,1-Dichloroethene	88 J	4800 U	520 U	440 U
1,2,4-Trimethylbenzene	120 J	4800 U	520 U	440 U
1,3,5-Trimethylbenzene	30 J	4800 U	520 U	440 U
Acetone	470 J	95000 U	500 J	430 J
Bromomethane	960 U	9500 U	1000 U	870 U
Chlorobenzene	480 U	4800 U	520 U	440 U

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID / Date Sampled / Depth	271PITDP-0401N 2/24/99 0 - 4 ft bgs	271PITDP-0401D 2/24/99 0 - 4 ft bgs	271PITDP-0402N 2/24/99 4 - 8 ft bgs	271PITDP-0501N 2/24/99 0 - 4 ft bgs
Chloromethane	960 U	9500 U	1000 U	870 U
cis-1,2-Dichloroethene	130000 D	93000	1800	21 J
Ethylbenzene	37 J	4800 U	520 U	440 U
Hexachlorobutadiene	480 U	4800 U	520 U	440 U
m-Xylene	180 J	4800 U	520 U	440 U
Methyl Ethyl Ketone	520 J	95000 U	570 J	490 J
Methylene Chloride	480 U	4800 U	51 J	42 J
n-Butylbenzene	480 U	4800 U	520 U	440 U
Naphthalene	39 J	9500 U	1000 U	870 U
o-Xylene	79 J	4800 U	520 U	440 U
Tetrachloroethene	200 J	180 J	520 U	440 U
Toluene	86 J	4800 U	520 U	440 U
trans-1,2-Dichloroethene	4700	3100 J	61 J	440 U
Trichloroethene	400000 D	220000 D	680	24 J
Vinyl Chloride	190 U	1900 U	130 J	170 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
2-Methylnaphthalene	210 U	200 U	200 U	190 U
Acenaphthene	210 U	200 U	200 U	190 U
Acenaphthylene	210 U	200 U	200 U	190 U
Anthracene	53 J	54 J	200 U	190 U
Benzo(a)anthracene	170 J	160 J	52 J	190 U
Benzo(a)pyrene	160 J	130 J	45 J	190 U
Benzo(b)fluoranthene	160 J	130 J	40 J	190 U

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled Depth	271PITDP-0401N 2/24/99 0 - 4 ft bgs	271PITDP-0401D 2/24/99 0 - 4 ft bgs	271PITDP-0402N 2/24/99 4 - 8 ft bgs	271PITDP-0501N 2/24/99 0 - 4 ft bgs
Benzo(g,h,i)perylene	66 J	200 U	200 U	190 U
Benzo(k)fluoranthene	140 J	120 J	200 U	190 U
bis(2-Ethylhexyl)phthalate	180 J	200 U	110 J	92 J
Chrysene	200 J	170 J	57 J	190 U
Dibenzofuran	210 U	200 U	200 U	190 U
Fluoranthene	460	400	130 J	190 U
Fluorene	210 U	200 U	200 U	190 U
Hexachlorobutadiene	210 U	200 U	200 U	190 U
Indeno(1,2,3-c,d)pyrene	67 J	200 U	200 U	190 U
Naphthalene	210 U	200 U	200 U	190 U
Phenanthrene	210	210	75 J	190 U
Pyrene	390	330	110 J	190 U
Analyte	**PCBs by SW8080 (ug/kg)**			
Aroclor 1260	21 U	20 U	20 U	19 U
Analyte	**TPH by M8015D (ug/kg)**			
PHC as Gasoline	1000	13000 D	790	120 U
PHC C16-C32	28000	15000	42800	8700 J

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled Depth	271PITDP-0502N 2/24/99 4 - 8 ft bgs	271PITDP-0601N 2/24/99 0 - 4 ft bgs	271PITDP-0602N 2/24/99 4 - 8 ft bgs	271PITDP-0603N 2/24/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	10000	18000	19000	24000
Arsenic	8 8	19	17	16
Barium	74	160	140	160
Beryllium	0 58 U	0 98	0 94	1 2
Chromium (Total)	13	22	23	27
Cobalt	6 4	13	15	24
Copper	20	32	29	33
Iron	20000	38000	41000	51000
Lead	11	21	18	31
Manganese	170	310	2400	920
Nickel	18	35	33	36
Selenium	0 56 S	0 64 S	0 71 S	1 5 S
Thallium	0 75 S	0 77 S	0 56 S	0 46 S
Vanadium	21	40	36	52
Zinc	70	100	100	95
Analyte	**Volatiles by SW8260 (ug/kg)**			
1,1-Dichloroethene	470 U	490 U	610 U	530 U
1,2,4-Trimethylbenzene	470 U	490 U	610 U	530 U
1,3,5-Trimethylbenzene	470 U	490 U	610 U	530 U
Acetone	500 J	720 J	990 J	780 J
Bromomethane	930 U	100 J	91 J	81 J
Chlorobenzene	470 U	490 U	610 U	530 U
Chloromethane	930 U	980 U	25 J	1100 U

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled Depth	271PITDP-0502N 2/24/99 4 - 8 ft bgs	271PITDP-0601N 2/24/99 0 - 4 ft bgs	271PITDP-0602N 2/24/99 4 - 8 ft bgs	271PITDP-0603N 2/24/99 8 - 12 ft bgs
cis-1,2-Dichloroethene	54 J	490 U	50 J	92 J
Ethylbenzene	470 U	490 U	610 U	530 U
Hexachlorobutadiene	470 U	71 J	610 U	530 U
m-Xylene	470 U	18 J	24 J	530 U
Methyl Ethyl Ketone	550 J	740 J	990 J	860 J
Methylene Chloride	48 J	490 U	610 U	32 J
n-Butylbenzene	470 U	490 U	610 U	530 U
Naphthalene	930 U	980 U	21 J	1100 U
o-Xylene	470 U	490 U	610 U	530 U
Tetrachloroethene	470 U	490 U	610 U	530 U
Toluene	470 U	490 U	24 J	530 U
trans-1,2-Dichloroethene	470 U	490 U	610 U	34 J
Trichloroethene	470 U	490 U	610 U	76 J
Vinyl Chloride	190 U	200 U	410	130 J
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
2-Methylnaphthalene	190 U	200 U	220 U	220 U
Acenaphthene	190 U	200 U	220 U	220 U
Acenaphthylene	190 U	200 U	220 U	220 U
Anthracene	190 U	200 U	220 U	220 U
Benzo(a)anthracene	190 U	200 U	220 U	220 U
Benzo(a)pyrene	190 U	200 U	220 U	220 U
Benzo(b)fluoranthene	190 U	200 U	220 U	220 U
Benzo(g,h,i)perylene	190 U	200 U	220 U	220 U

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled Depth	271PITDP-0502N 2/24/99 4 - 8 ft bgs	271PITDP-0601N 2/24/99 0 - 4 ft bgs	271PITDP-0602N 2/24/99 4 - 8 ft bgs	271PITDP-0603N 2/24/99 8 - 12 ft bgs
Benzo(k)fluoranthene	190 U	200 U	220 U	220 U
bis(2-Ethylhexyl)phthalate	100 J	95 J	140 J	150 J
Chrysene	190 U	200 U	220 U	220 U
Dibenzofuran	190 U	200 U	220 U	220 U
Fluoranthene	190 U	200 U	220 U	220 U
Fluorene	190 U	200 U	220 U	220 U
Hexachlorobutadiene	190 U	200 U	220 U	220 U
Indeno(1,2,3-c,d)pyrene	190 U	200 U	220 U	220 U
Naphthalene	190 U	200 U	220 U	220 U
Phenanthrene	190 U	200 U	220 U	220 U
Pyrene	190 U	200 U	220 U	220 U
Analyte	**PCBs by SW8080 (ug/kg)**			
Aroclor 1260	19 U	20 U	22 U	22 U
Analyte	**TPH by M8015D (ug/kg)**			
PHC as Gasoline	120 U	120 U	140 U	44 J
PHC C16-C32	28000	12000	5300 J	6800 J

Table 4.5-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled Depth	271PITDP-0502N 2/24/99 4 - 8 ft bgs	271PITDP-0601N 2/24/99 0 - 4 ft bgs	271PITDP-0602N 2/24/99 4 - 8 ft bgs	271PITDP-0603N 2/24/99 8 - 12 ft bgs

Note: Sample IDs 271PITDP-0302D and 271PITDP-0401D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.5-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Thermodynamics Lab 271 (271-ACVPIT)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	24000
Arsenic	5 05882	24
Barium	140000 00	160
Beryllium	1 20000	1.2
Calcium	NA	69000
Cobalt	10000	24
Chromium (Total)	27 00000	27
Copper	70000	37
Iron	100000	59000
Potassium	NA	3000
Magnesium	NA	25000
Manganese	45000	2400
Sodium	NA	250
Nickel	3700 00	43
Lead	2800	31
Selenium	10000 00	1 5
Thallium	160	0 8
Vanadium	14000	52
Zinc	370000 00	120
Volatiles by SW8260		

Table 4.5-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Thermodynamics Lab 271 (271-ACVPIT)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
Acetone	55000 00	0 99
Bromomethane	NA	0 1
n-Butylbenzene	250	0 03
Toluene	520 00	0 086
Chloromethane	0 02500	0 025
1,1-Dichloroethene	0 08800	0 088
cis-1,2-Dichloroethene	1200 00	130
trans-1,2-Dichloroethene	2500 00	4 7
Ethylbenzene	230 00	0 037
Hexachlorobutadiene	0 07100	0 071
Methyl Ethyl Ketone	27000 00	0 99
Methylene Chloride	0 05100	0 051
Naphthalene	22000 00	0 039
Tetrachloroethene	0 20000	0 2
Trichloroethene	183.99767	400
1,2,4-Trimethylbenzene	260	0 12
1,3,5-Trimethylbenzene	200	0 03
Vinyl Chloride	0 14706	0.41
m-Xylene	NA	0 18
o-Xylene	NA	0 079
Semivolatiles by SW8270		

Table 4.5-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Thermodynamics Lab 271 (271-ACVPIT)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
Acenaphthene	18000 00	1 8
Acenaphthylene	NA	1
Anthracene	91000 00	4 6
bis(2-Ethylhexyl)phthalate	0 18000	0 18
Benzo(a)anthracene	1 82353	9
Benzo(a)pyrene	0 18235	7.1
Benzo(b)fluoranthene	1 82353	5.7
Benzo(g,h,i)perylene	9100 00	2 6
Benzo(k)fluoranthene	6 10000	6 1
Chrysene	8 20000	8 2
Dibenzofuran	3200	0 84
Fluorene	12000 00	1.8
Fluoranthene	12000 00	18
Indeno(1,2,3-c,d)pyrene	1 82353	2.7
2-Methylnaphthalene	76000 00	0 38
Naphthalene	22000 00	0 18
Phenanthrene	91000 00	16
Pyrene	9100 00	15
PCBs by SW8080		
Aroclor 1260	25	0 02
TPH by M8015D		

Table 4.5-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Thermodynamics Lab 271 (271-ACVPIT)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
PHC C16-C32	40000	790
PHC as Gasoline	8000	13

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Table 4.5-3

Summary of Analyte Concentrations for Groundwater Samples
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID / Date Sampled	VAP Generic Unrestricted Potable Use Standard	271PITGW-01N 2/24/99
Analyte	**Inorganics (Total) by SW6010 (ug/L)**	
Aluminum	NA	190000
Barium	2000	2500
Cadmium	5	13
Chromium (Total)	100	410
Cobalt	NA	210
Copper	NA	4200
Iron	NA	490000
Lead	NA	410
Manganese	NA	7800
Nickel	100	630
Thallium	2	10
Vanadium	NA	460
Zinc	4700	2300
Analyte	**Volatiles by SW8260 (ug/L)**	
1,1-Dichloroethene	7	0 99 J
1,3,5-Trimethylbenzene	NA	13
Acetone	NA	9 J
Benzene	5	5.4
Chlorobenzene	NA	5 U
cis-1,2-Dichloroethene	70	38
Ethylbenzene	700	2 5 J

Table 4.5-3

Summary of Analyte Concentrations for Groundwater Samples (Continued)
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	271PITGW-01N 2/24/99
Isopropylbenzene	NA	0 67 J
m-Xylene	NA	1 7 J
Methylene Chloride	5	2 8 J
n-Hexane	840	1 3 J
o-Xylene	NA	4 2 J
p-Cymene	NA	30
Toluene	1000	1 J
trans-1,2-Dichloroethene	100	14
Trichloroethene	5	43
Vinyl Chloride	2	13
Analyte	**Semivolatiles by SW8270 (ug/L)**	
2-Methylnaphthalene	NA	6 J
Acenaphthene	NA	13 J
Benzo(a)anthracene	NA	3 5 J
Benzo(a)pyrene	NA	2 7
Benzo(b)fluoranthene	NA	2 5 J
Benzo(k)fluoranthene	NA	2 5 J
bis(2-Ethylhexyl)phthalate	NA	3 8 J
Chrysene	NA	5 2 J
di-n-Butylphthalate	NA	3 6 J
Fluoranthene	NA	11 J
Fluorene	NA	17 U

Table 4.5-3

Summary of Analyte Concentrations for Groundwater Samples (Continued)
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	271PITGW-01N 2/24/99
Phenanthrene	NA	44 U
Pyrene	NA	9 4 J
Analyte	**TPH by M8015 (ug/L)**	
PHC as Gasoline	NA	1100
PHC C16-C32	NA	16000

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard.

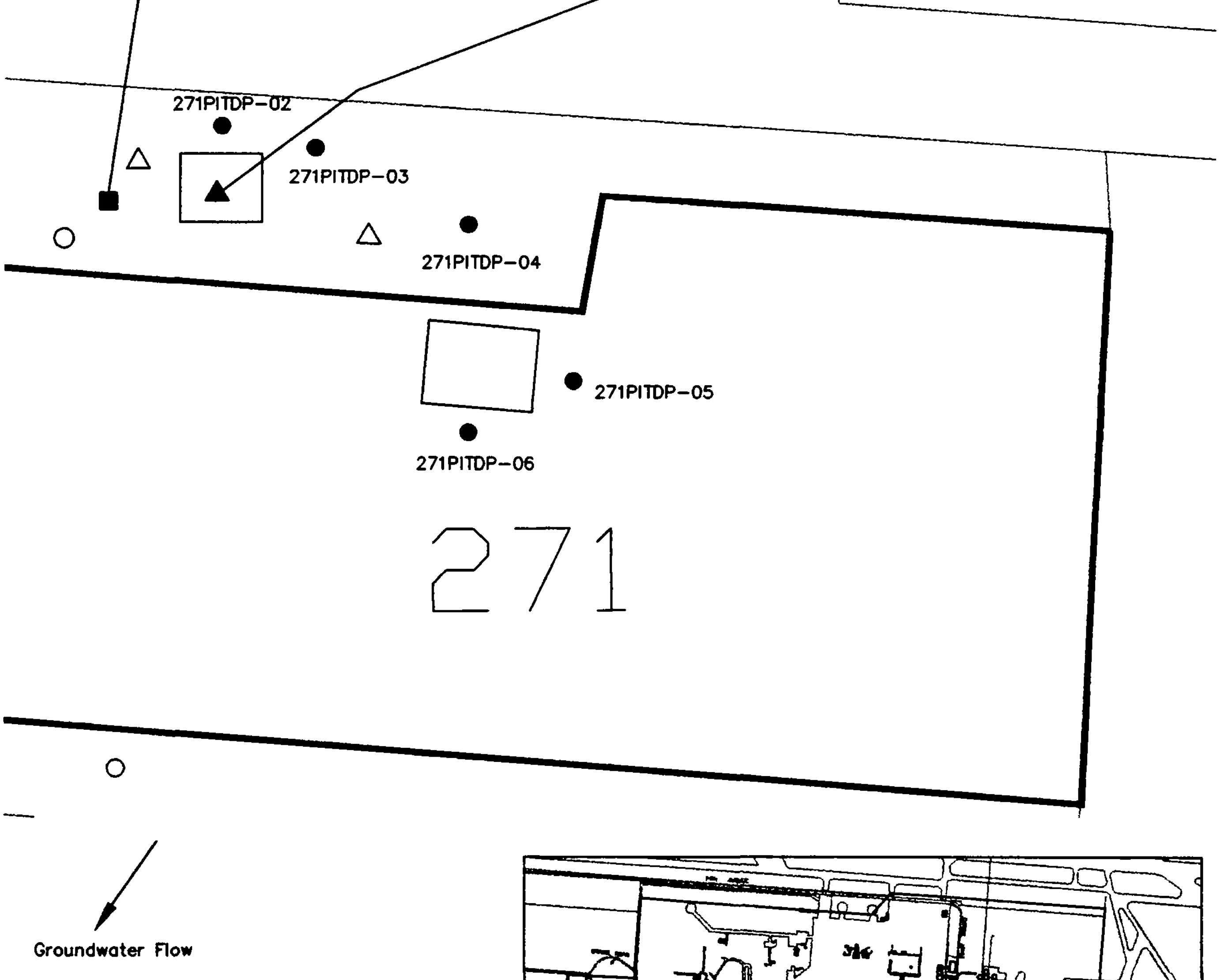
Key:
J = Estimated
NA = Not available
U = Not detected
ug/L = Micrograms per Liter

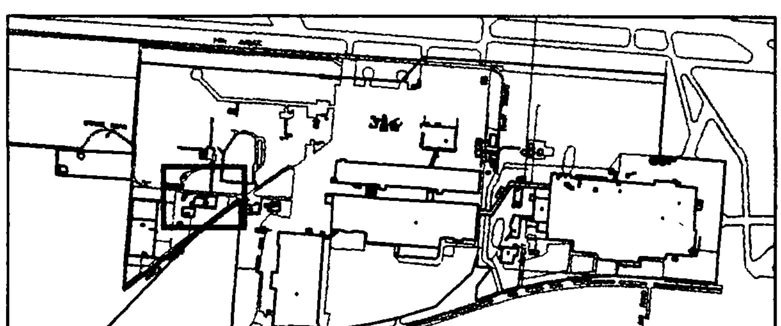
271PITDP-01

Chemicals	Detected Concentration
Barium	2,500
Cadmium	13
Chromium	410
Nickel	630
Thallium	10
Benzene	5.4
Trichloroethene	43
Vinyl Chloride	13

271PITGR-01

Chemicals	Detected Concentration
Barium	21
Iron	190
Zinc	98
1,1-Dichlorethene	0.31
1,2-Dichlorethane	0.19
Bromodichloromethane	2.6
Chlorodibromomethane	0.51
Chloroform	14
Cis-1,2-Dichloroethene	30
Dichlorodifluoromethane	2.9
Trans-1,2-Dichlorethene	0.25
Trichlorethene	190
Vinyl Chloride	0.69
TPH	100





Legend
- ● Direct Push Sample Location
- ▲ Liquid Grab Sample Location
- ■ Groundwater Sample Location
- △ Proposed Borehole Location
- ○ Proposed Well Location

0' 15' 30' 60'
SCALE

EARTH TECH

Figure 4.5-2

Thermodynamics Lab 271 (271-ACVPIT) Groundwater and Liquid Grab Sample Locations and Analyte Concentrations (ug/L)

29179.4.1-5.DWG/PLT

Table 4.5-4

Summary of Analyte Concentrations for Grab Samples
Thermodynamics Lab 271 (271-ACVPIT)

Sample ID Date Sampled	271PITGR-01N 2/19/99
Analyte	**Inorganics by SW6010 (ug/l)**
Barium	21
Iron	190
Zinc	98
Analyte	**Volatiles by SW8260 (ug/l)**
1,1-Dichloroethene	0 31 J
1,2-Dichloroethane	0 19 J
Bromodichloromethane	2 6 J
Chlorobenzene	5 U
Chlorodibromomethane	0 51 J
Chloroform	14
cis-1,2-Dichloroethene	30
Dichlorodifluoromethane	2 9 J
trans-1,2-Dichloroethene	0 25 J
Trichloroethene	190 D
Vinyl Chloride	0 69 J
Analyte	**TPH by M8015 (ug/l)**
PHC as Gasoline	100

Key:
D = The analyte was quantified at a secondary dilution factor
J = Estimated
U = Not detected
ug/L = Micrograms per Liter

All groundwater, liquid grab and wipe data points are useable. All soil sample data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at 271-ACVPIT:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	884	0	100%	7.6%	1.7%
SVOCs	858	0	100%	5.6%	0%
PCBs	91	0	100%	1.1%	0%
TPH (GRO and DRO)	26	0	100%	65.3%	0%
Inorganics	286	13	95.5%	28.3%	0%
Groundwater					
VOCs	68	0	100%	11.8%	2.9%
SVOCs	66	0	100%	16.7%	0%
PCBs	7	0	100%	0%	0%
TPH (GRO and DRO)	2	0	100%	0%	0%
Inorganics	22	0	100%	4.5%	0%
Liquid Grab					
VOCs	68	0	100%	8.8%	0%
SVOCs	66	0	100%	1.5%	0%
PCBs	7	0	100%	0%	0%
TPH (GRO and DRO)	2	0	100%	0%	0%
Inorganics	22	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.5.5 Recommendations for Further Action

Based on field observations and analytical results, the following is recommended if the owner or appropriate regulatory authority determines that any remaining liquid contained in the 271-ACVPIT pit is solid waste: pump any remaining liquid out of the pit, characterize it using the TCLP, and dispose of it in accordance with applicable regulations.

As discussed in Section 4.5.3, metals, numerous polycyclic aromatic hydrocarbons (PAHs), benzene, trichloroethene and vinyl chloride were detected in soil and groundwater at concentrations that exceeded VAP standards.

To determine whether contaminants in the pit or surrounding soils are leaching to groundwater, additional soil and groundwater sampling is recommended in the vicinity of the elevated inorganics and VOC hits. Two boreholes are recommended within a 50-foot radius of the contaminated sample location (271PITDP-01) for a total of two boreholes. Since groundwater was reached in the Phase II-Winter 99 field effort at only one borehole location, both proposed boreholes will be drilled to groundwater. Soil samples will be collected every 5 feet, and groundwater will be sampled. Samples will be analyzed for barium, cadmium, chromium, nickel, thallium, benzene, trichloroethene and vinyl chloride. Proposed sample locations are shown in

Figure 4.5-2. In addition, two wells should be installed hydrologically downgradient of the contaminated sample location for a total of two wells.

In accordance with OAC 3745-300-07(D)(2), complete pathways must be determined for 271-ACVPIT. The potentially complete pathway is exposure to groundwater containing chemicals of concern. On-site or off-site receptors may be exposed to groundwater in the following ways:

- Ingestion of chemicals of concern if groundwater is used as a drinking water source.
- Dermal contact with chemicals of concern if groundwater is used for bathing/showering or is contacted incidentally during other potable or process use by receptors.
- Inhalation of VOCs released from groundwater if groundwater is used for bathing/showering or is contacted incidentally during other potable or process use by receptors.

If groundwater sampling analytical results indicate any chemicals of concern exceed the unrestricted potable use standards, then there are two choices. The first choice is to use institutional or engineering controls to prevent human exposure to chemicals of concern or to remediate groundwater. The second choice is to classify the groundwater. On the basis of groundwater classification, a different set of cleanup requirements will be determined.

The additional groundwater sampling will determine the horizontal extent of contamination. On the basis of this determination, either a baseline risk assessment or further sampling will be conducted.

271-ACVPIT is designated Category 7.

4.6 DRAINS (13, 13-WRACK)

The former Building 13 contained a paint stripping shop that had floor drains leading to Mason's Run. The wash rack area north of the building similarly was equipped with drop inlets. The drains lead to the sanitary sewer (SSEWER) prior to 1965 and to a process line (PSEWER) after 1965.

4.6.1 Site Summary

Wastes suspected to have been discharged include methylene chloride and phenolic strippers (References 37, 52, and 109). Sampling of soils for phenols was recommended beneath the drains to determine if release has occurred. 13 and 13-WRACK have been designated as Category 7.

4.6.2 Field Activities Conducted

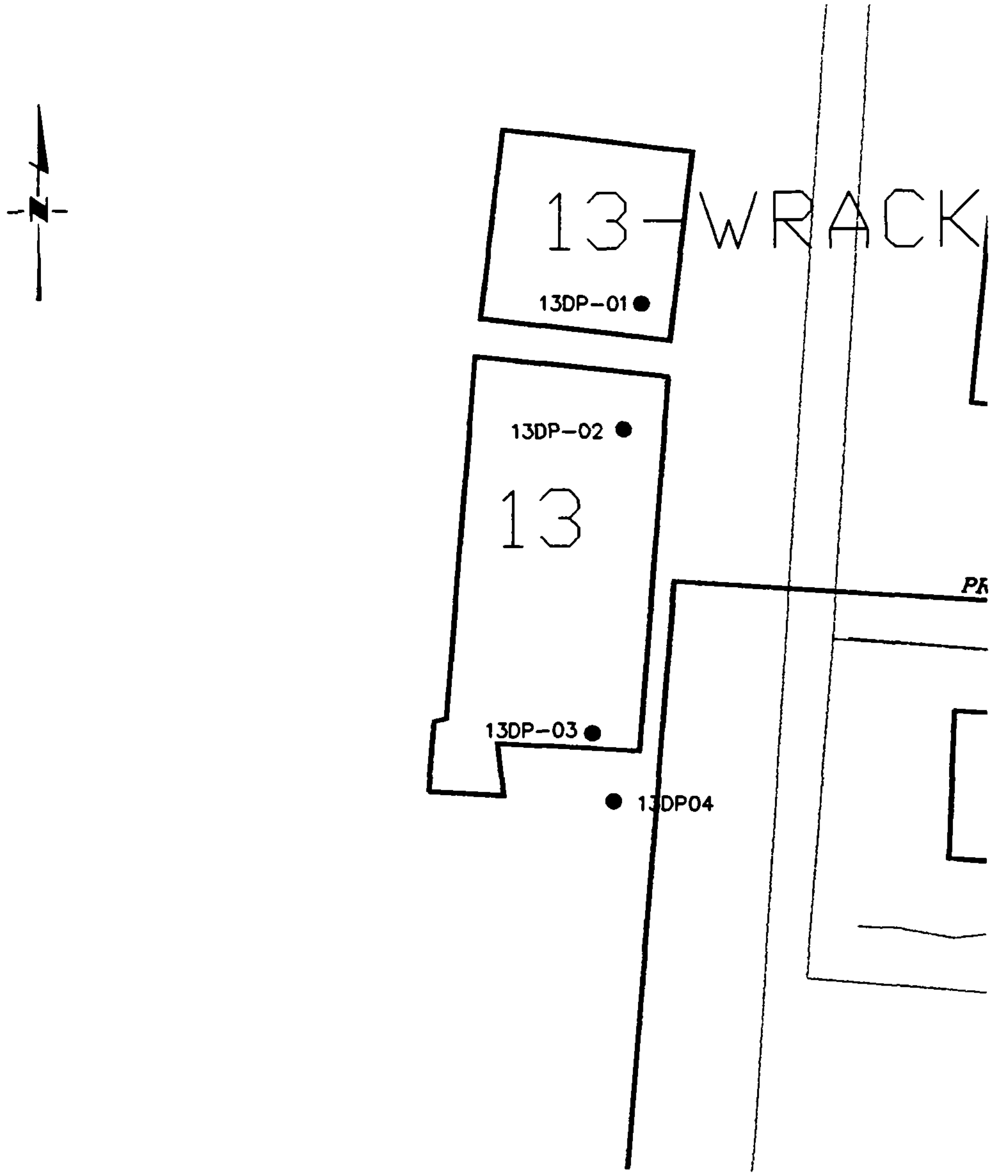
Four boreholes were advanced at this location in the area of the two former drains. Each borehole was continuously sampled every five feet until groundwater or refusal. Seven direct push soil samples were collected at 13 and 13-WRACK and analyzed for SVOCs and metals. Groundwater was not collected at this site. Sample locations are shown in Figure 4.6-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

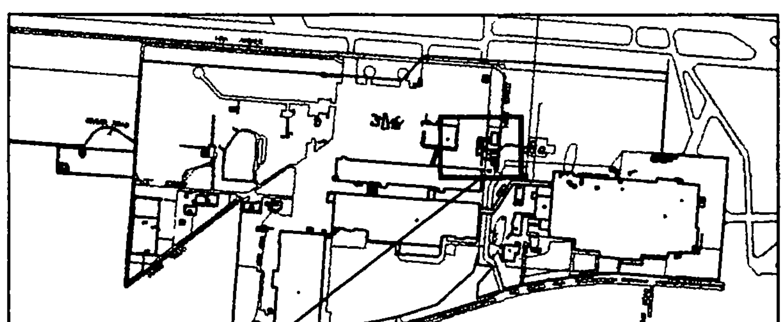
Number of Samples Collected at Drains (13, 13-WRACK)				
Sampling Point	Soil(1)	Groundwater	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	7	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Semivolatile Organic Compounds (SW8270), Metals (SW3050/6010), and soil moisture (ASTM D2216).

4.6.3 Results

Bis(2-ethylhexyl)phthalate and numerous inorganics were detected in soil samples collected at 13 and 13-WRACK; concentrations are presented in Table 4.6-1. Table 4.6-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Four boreholes were advanced at 13, 13-WRACK; depths ranged from 8 to 12 feet bgs. The soils encountered varied from brown silty clay to yellow brown clay, with gravel and sand. Groundwater was encountered between 5 and 8 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 2.65×10^{-8} cm/s was reported at the nearby Process Sewers, and a value of 3.82×10^{-8} cm/s was reported at the IWTP Process Tanks site.





Area of Interest

Legend

● Direct Push Sample Location

0' 25' 50' 100'

SCALE

EARTH TECH

Figure 4.6-1

Drains (13,13-Wrack) Soil Sample Locations

29179.4.6-9.DWG/PLT

Table 4.6-1

Summary of Analyte Concentrations for Soil Samples
Drains (13 and 13-WRACK)

Sample ID Date Sampled Depth	13DP-0101N 2/19/99 4 - 8 ft bgs	13DP-0101D 2/19/99 4 - 8 ft bgs	13DP-0201N 2/19/99 0 - 4 ft bgs	13DP-0202N 2/19/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	16000	15000	17000	19000
Arsenic	23	24	24	11
Barium	160	150	120	180
Beryllium	0 97	0 8	0 9	1
Cadmium	0 83	0 81	0 62 U	0 66 U
Chromium (Total)	22	20	57	25
Cobalt	17	16	14	16
Copper	40	32	32	28
Iron	51000	40000	42000	38000
Lead	19	17	20	18
Manganese	700	670	470	390
Nickel	57	45	37	34
Selenium	0 25 U	0 24 U	0 25 U	0 26 U
Thallium	1 8 S	3 U	3 1 U	0 74 S
Vanadium	48	41	39	48
Zinc	140	120	110	110
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
bis(2-Ethylhexyl)phthalate	150	69	69	85

Table 4.6-1

Summary of Analyte Concentrations for Soil Samples
Drains (13 and 13-WRACK)

Sample ID Date Sampled Depth	13DP-0301N 2/19/99 0 - 4 ft bgs	13DP-0302N 2/19/99 4 - 8 ft bgs	13DP-0401N 2/19/99 4 - 8 ft bgs	13DP-0402N 2/19/99 8 - 9 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	24000	19000	19000	18000
Arsenic	29	6 4	5 6	13
Barium	160	190	180	190
Beryllium	0 86	1	1	0 95
Cadmium	0 66 U	0 72 U	0 68 U	0 67 U
Chromium (Total)	55	45	23	25
Cobalt	18	11	10	14
Copper	30	30	34	32
Iron	47000	33000	31000	29000
Lead	41	18	18	18
Manganese	440	340	200	310
Nickel	22	30	31	37
Selenium	0 4	0 29 U	0 4	0 27 U
Thallium	1 1 S	1 5 S	1.1 S	1 3 S
Vanadium	55	51	49	48
Zinc	87	130	120	130
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
bis(2-Ethylhexyl)phthalate	220 U	160	230 U	100

Table 4.6-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Drains (13 and 13-WRACK)

Sample ID Date Sampled Depth	13DP-0301N 2/19/99 0 - 4 ft bgs	13DP-0302N 2/19/99 4 - 8 ft bgs	13DP-0401N 2/19/99 4 - 8 ft bgs	13DP-0402N 2/19/99 8 - 9 ft bgs

Note: Sample ID 13DP-0101D is a field duplicate

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.6-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Drains (13 AND 13-WRACK)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
Inorganics by SW6010		
Aluminum	1000000 00	24000
Arsenic	86 00	29
Barium	140000 00	190
Beryllium	30	1
Calcium	NA	15000
Cadmium	300 00	0 83
Cobalt	10000	18
Chromium (Total)	2800 00	57
Copper	70000	40
Iron	100000	51000
Potassium	NA	2800
Magnesium	NA	8500
Manganese	45000	700
Sodium	NA	120
Nickel	3700 00	57
Lead	2800	41
Selenium	10000 00	0 4
Thallium	160	1 8
Vanadium	14000	55
Zinc	370000 00	140

Table 4.6-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Drains (13 AND 13-WRACK)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
bis(2-Ethylhexyl)phthalate	860 00	0 16

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

4.6.4 Data Validation Summary

Seven soil samples and one soil duplicate were collected at 13 and 13-WRACK and were analyzed for SVOCs and inorganics.

Non-detect result of 3,3'-dichlorobenzidine were qualified R and rejected for sample 13DP-0301N due to low percent recovery of matrix spikes and a high relative percent difference (RPD) between matrix spike and matrix spike duplicate results.

Non-detect results for selenium were qualified R and rejected for six soil samples due to low percent recovery of matrix spikes and a high RPD between matrix spike and matrix spike duplicate results.

All soil data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at 13 and 13-WRACK:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	528	1	99.8%	5.1%	0%
TPH (GRO and DRO)	176	6	96.6%	35.2%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.6.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. 13, 13-WRACK is recommended for Category 4 designation.

4.7 IRP SITE 1 – MAGNESIUM CHIP BURN SITE

IRP Site 1, the Magnesium Chip Burn Site was identified during Phase I. This site was used to burn magnesium chips that were a production byproduct. Burn activities were conducted from 1970 to 1972, then the site was abandoned and backfilled (Reference 129). The site was designated as Category 7 in the EBS (Reference 213).

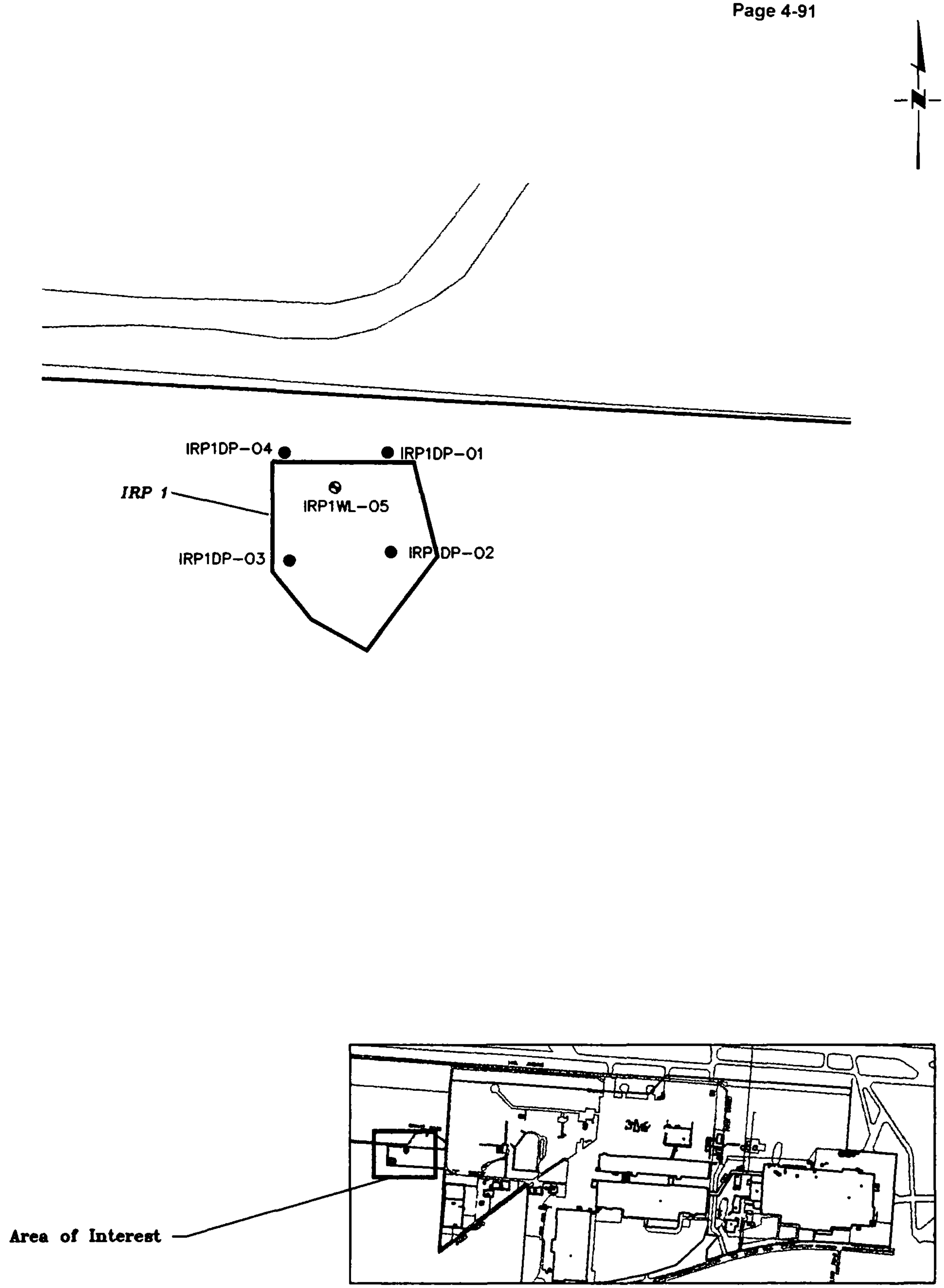
4.7.1 Site Summary

The plant Resource Conservation and Recovery Act (RCRA) Part A permit application (1980) indicated that the facility had waste piles in the southwest corner of the plant property in this area. The USEPA Notification of Hazardous Waste Site (1981) indicated that the past waste piles identified in the Part A permit contained non-hazardous metal chips and roof gravel. Rockwell had the waste piles removed and restored the area to an open yard for tool storage (Reference 106). On a site map revised in 1973, the area is designated as graveled tool storage (Reference 251). Turkey Run flows between the areas where the waste piles were located (Reference 106). It is assumed that these waste piles are what is currently the Magnesium Chip Burn Site.

No samples were collected during the Phase I or Phase II IRP at this site. Soil samples and a groundwater sample were obtained at this site as part of the base-wide United States Geologist Survey (USGS) surface water and groundwater sampling program established in 1996. Soil boreholes USB15, USB16, and USB17 were drilled and soil sampled at selected intervals. One groundwater monitoring well (USW16) was installed and groundwater sampled. Soil and groundwater samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and total metals. Soil sampling and monitoring well installation was completed from November 11 to December 10, 1996. Groundwater sampling was conducted on December 16-17, 1996 (Reference 220). The Nuclear Regulatory Commission (NRC) inspected AFP 85 and provided a report (Reference 186) requesting soil at IRP Site 1 be analyzed for thorium. This is due to speculation that radioactive material was stored at the site.

4.7.2 Field Activities Conducted

Four boreholes were advanced at this location using direct push technology. Each borehole was continuously sampled every five feet until groundwater or refusal. Seven direct push soil samples were collected at IRP Site 1 and analyzed for VOCs, metals, GRO, DRO and Thorium. Two boreholes (IRP1-01 and IRP1-02) were inadvertently omitted from being analyzed for pesticides/PCBs and semivolatiles. Groundwater monitoring well IRP1-01 was installed at 17 feet bgs. Three soil samples were collected and analyzed for VOCs, SVOCs, pesticides, PCBs, GRO, DRO and thorium. Groundwater samples were collected from the new groundwater monitoring well and from an existing well, USW16, and were analyzed for VOCs, SVOCs, metals, GRO, and DRO. Sample locations are shown in Figure 4.7-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.



Legend

- Direct Push Sample Location
- Installed Monitoring Well Sample Location

0' 25' 50' 100'

SCALE

EARTH TECH

Figure 4.7-1

Magnesium Burn Chip Site
IRP Site 1
Soil Sample Locations

Number of Samples Collected at IRP Site 1				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other
Existing Wells	--	1	--	--
New Wells	3	1	--	--
Borehole	--	--	--	--
Direct Push Hole	7	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Volatile organic compounds (SW8260); pesticides/PCBs (SW3500/SW8080); semivolatile organic compounds (SW3550/8270), gasoline range organics and diesel range organics (SW8015M), metals (SW3050/6010), thorium (NAS-NS-3004), and soil moisture (ASTM D2216).

(2) Groundwater analytical suite: semivolatile organic compounds (SW3510/SW8270), volatile organic compounds (SW8260), gasoline range organics and diesel range organics (SW8015M), and metals (SW3005/SW6010).

4.7.3 Results

TPH and numerous inorganics, thorium, and VOCs were detected in soil samples collected at IRP Site 1; *concentrations are presented in* Table 4.7-1. Bis(2-ethylhexyl)phthalate was detected in a soil sample collected from monitoring well IRP1WL-05. Table 4.7-2 presents a comparison between the maximum detected concentration and the adjusted VAP standard for each analyte. No concentration exceeded the respective adjusted soil standard. Thorium concentrations did not exceed the Occupational Hazard Standards taken from Nuclear Regulatory Commission Code of Federal Regulation (CFR) tables. Soils encountered at IRP Site 1 were yellow brown silty clay with gravel. No sample was collected at IRP Site 1 for vertical conductivity determination. However, the vertical conductivity of soils was determined at IRP Site 6, which is in the vicinity of IRP Site 1. The conductivity value at IRP Site 6 was 1.7×10^{-8} cm/s. This value is typical of glacial till.

Numerous inorganics were detected in the two groundwater samples collected from the wells at IRP Site 1. The detected analytes are presented in Table 4.7-3. Bis(2-ethylhexyl)phthalate was detected at the newly installed well IRP1WL-05, while TPH was detected at existing well USW16WL-01. Chromium was detected in the groundwater sample collected at USW16GW-01 at a concentration exceeding the respective VAP generic unrestricted potable use standard. No other analytes exceeded their respective standards. Figure 4.7-2 shows the location of the elevated concentration.

4.7.4 Data Validation Summary

Ten soil samples, three soil duplicates and two groundwater samples were collected at IRP Site 1 and were analyzed for VOCs, SVOCs, TPH (GRO and DRO) and inorganics. The soil samples were also analyzed for pesticides/PCBs and thorium.

Table 4.7-1

Summary of Analyte Concentrations for Soil Samples
Magnesium Chip Burn Site (IRP Site 1)

Sample ID / Date Sampled / Depth	IRP1DP-0101N 2/19/99 4 - 8 ft bgs	IRP1DP-0101D 2/19/99 4 - 8 ft bgs	IRP1DP-0102N 2/19/99 8 - 12 ft bgs	IRP1DP-0201N 2/19/99 4 - 8 ft bgs	IRP1DP-0202N 2/19/99 8 - 12 ft bgs	IRP1DP-0202D 2/19/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	15000	11000	17000	11000	15000	8300
Arsenic	16	23	17	15	20	11
Barium	100	74	150	90	95	60
Beryllium	0 88	0 77	0 84	0 8	0 8	0 57 U
Cadmium	0 63 U	1 1	0 79	1 6	0 63	0 66
Chromium (Total)	24	18	25	17	27	14
Cobalt	12	16	11	16	12	10
Copper	29	42	30	57	32	29
Iron	33000	42000	30000	38000	37000	26000
Lead	18	17	19	11	16	13
Manganese	200	400	380	530	490	210
Nickel	33	50	34	52	38	33
Selenium	0 25 U	0 24 U	0 25 U	0 24 U	0 24 U	0 33
Thallium	0 83 S	1 2 S	0 86 S	1 2 S	0 69 S	0 82 S
Vanadium	39	39	41	75	40	25
Zinc	120	160	120	150	130	98
Analyte	**Volatiles by SW8260 (ug/kg)**					
Acetone	11000 U	9600 U	740 J	730 J	450 J	530 J
Bromomethane	1100 U	960 U	1000 U	89 J	54 J	1000 U
Chlorobenzene	570 U	480 U	500 U	480 U	490 U	510 U
Methyl Ethyl Ketone	11000 U	9600 U	720 J	690 J	630 J	720 J
Methylene Chloride	570 U	480 U	27 J	32 J	17 J	42 J

Table 4.7-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Magnesium Chip Burn Site (IRP Site 1)

Sample ID Date Sampled Depth	IRP1DP-0101N 2/19/99 4 - 8 ft bgs	IRP1DP-0101D 2/19/99 4 - 8 ft bgs	IRP1DP-0102N 2/19/99 8 - 12 ft bgs	IRP1DP-0201N 2/19/99 4 - 8 ft bgs	IRP1DP-0202N 2/19/99 8 - 12 ft bgs	IRP1DP-0202D 2/19/99 8 - 12 ft bgs
Toluene	570 U	480 U	500 U	480 U	15 J	510 U
Analyte	**TPH by M8015D (ug/kg)**					
PHC as Gasoline	130 U	120 U	130 U	120 U	120 U	160
PHC C16-C32	5100 U	4800 U	5000 U	4800 U	55000	40000

Table 4.7-1

Summary of Analyte Concentrations for Soil Samples
Magnesium Chip Burn Site (IRP Site 1)

Sample ID Date Sampled Depth	IRP1DP-0301N 2/22/99 4 - 8 ft bgs	IRP1DP-0302N 2/22/99 8 - 12 ft bgs	IRP1DP-0401N 2/22/99 4 - 8 ft bgs	IRP1DP-0401D 2/22/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	11000	10000	10000	11000
Arsenic	31	13	23	37
Barium	71	57	60	150
Beryllium	0 76	0 61	0 73	0 77
Cadmium	1 6	1	1 1	1 5
Chromium (Total)	17	14	17	16
Cobalt	17	13	14	27
Copper	42	32	40	42
Iron	42000	30000	43000	49000
Lead	16	12	13	19
Manganese	610	320	200	1300
Nickel	62	40	54	60
Selenium	0 24 U	1 2 U	0 61 S	0 39 S
Thallium	2 1 S	1 1	0 8	0 85
Vanadium	38	29	37	29
Zinc	150	140	180	130
Analyte	**Volatiles by SW8260 (ug/kg)**			
Acetone	620 J	610 J	690 J	690 J
Bromomethane	1000 U	940 U	1100 U	1100 U
Chlorobenzene	510 U	470 U	560 U	550 U
Methyl Ethyl Ketone	650 J	640 J	730 J	710 J
Methylene Chloride	43 J	15 J	47 J	54 J

Table 4.7-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Magnesium Chip Burn Site (IRP Site 1)

Sample ID Date Sampled Depth	IRP1DP-0301N 2/22/99 4 - 8 ft bgs	IRP1DP-0302N 2/22/99 8 - 12 ft bgs	IRP1DP-0401N 2/22/99 4 - 8 ft bgs	IRP1DP-0401D 2/22/99 4 - 8 ft bgs
Toluene	510 U	470 U	560 U	550 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
bis(2-Ethylhexyl)phthalate	200 U	190 U	200 U	200 U
Analyte	**TPH by M8015D (ug/kg)**			
PHC as Gasoline	120 U	120 U	120 U	120 U
PHC C16-C32	15000	7100 J	4900 U	4900 U

Table 4.7-1

Summary of Analyte Concentrations for Soil Samples
Magnesium Chip Burn Site (IRP Site 1)

Sample ID / Date Sampled / Depth	IRP1WL-0501N 2/17/99 5 - 7 ft bgs	IRP1WL-0502N 2/17/99 10 - 12 ft bgs	IRP1WL-0503N 2/17/99 15 - 17 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**		
Aluminum	14000	9300	4300
Arsenic	17	14	6
Barium	90	49	21
Beryllium	0 87	0 59 U	0 56 U
Cadmium	1 1	1.1	0 61
Chromium (Total)	20	13	6 4
Cobalt	28	11	4 8
Copper	41	29	27
Iron	46000	20000	12000
Lead	16	15	8 4
Manganese	590	230	290
Nickel	52	32	13
Selenium	0 49 U	0 7 S	0 45 U
Thallium	0 85 S	1 2 S	0 45 U
Vanadium	53	33	16
Zinc	160	120	52
Analyte	**Volatiles by SW8260 (ug/kg)**		
Acetone	390 J	440 J	390 J
Bromomethane	990 U	1100 U	960 U
Chlorobenzene	490 U	530 U	480 U
Methyl Ethyl Ketone	710 J	820 J	720 J
Methylene Chloride	55 J	59 J	53 J
Toluene	16 J	21 J	21 J

Table 4.7-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Magnesium Chip Burn Site (IRP Site 1)

Sample ID Date Sampled Depth	IRP1WL-0501N 2/17/99 5 - 7 ft bgs	IRP1WL-0502N 2/17/99 10 - 12 ft bgs	IRP1WL-0503N 2/17/99 15 - 17 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**		
bis(2-Ethylhexyl)phthalate	200 U	200	190 U
Analyte	**TPH by M8015D (ug/kg)**		
PHC as Gasoline	120 U	120 U	110 U
PHC C16-C32	6500 J	47000	62000

Note: Sample IDs IRP1DP 0101D, IRP1DP-0202D and IRP1DP-0401D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.7-1

Summary of Thorium Concentrations for Soil Samples (pCi/g)

Magnesium Chip Burn Site (IRP Site 1)

Sample ID Date Sampled Depth	Relevant Standard *	IRP1-0101N 2/19/99 4-8 ft bgs			IRP1-0101D 2/19/99 4-8 ft bgs			IRP1-0102N 2/19/99 8-12 ft bgs			IRP1-0201N 2/19/99 4-8 ft bgs		
Analyte		Activity	Error	LLD	Activity	Error	LLD	Activity	Error	LLD	Activity	Error	LLD
Thorium-228	15	1	0 3	0 2	1 3	0 4	0 1	0 9	0 3	0 1	0 8	0 3	0 1
Thorium-230	15	3 7	0 9	0 1	3 8	0 9	0 1	2 9	0 7	0 1	3 4	0 8	0 1
Thorium-232	15	1	0 3	0 1	1 3	0 4	0 1	1	0 3	0 1	0 9	0 3	0 1

Sample ID Date Sampled Depth	Relevant Standard *	IRP1-0401N 2/22/99 4-8 ft bgs			IRP1-0401D 2/22/99 4-8 ft bgs			IRP1WL-0501N 2/17/99 5-7 ft bgs			IRP1WL-0502N 2/17/99 10-12 ft bgs			IRP1WL-0503N 2/17/99 15-17 ft bgs		
Analyte		Activity	Error	LLD	Activity	Error	LLD	Activity	Error	LLD	Activity	Error	LLD	Activity	Error	LLD
Thorium-228	15	1	0 3	0 1	1 1	0 4	0 1	1 8	0 6	0 2	0 9	0 4	0 2	0 5	0 2	0 1
Thorium-230	15	2 7	0 6	0 1	3 7	0 9	0 1	4 6	1 1	0 1	3 1	0 8	0 1	1 3	0 4	0 1
Thorium-232	15	1	0 3	0 1	1 2	0 4	0 1	1 3	0 5	0 1	0 9	0 4	0 2	0 1	0 1	0 1

Sample ID Date Sampled Depth	Relevant Standard *	IRP1-0202N 2/19/99 8-12 ft bgs			IRP1-0202D 2/19/99 8-12 ft bgs			IRP1-0301N 2/22/99 4-8 ft bgs			IRP1-0302N 2/22/99 8-12 ft bgs		
Analyte		Activity	Error	LLD	Activity	Error	LLD	Activity	Error	LLD	Activity	Error	LLD
Thorium-228	15	0 9	0 3	0 1	0 9	0 3	0 1	1 1	0 4	0 2	1 1	0 4	0 1
Thorium-230	15	2 9	0 7	0 1	2 3	0 6	0 1	3 3	0 8	0 1	2 6	0 8	0 2
Thorium-232	15	0 6	0 2	0 1	0 8	0 3	0 1	1	0 3	0 1	0 9	0 3	0 1

* - 40 CFR Part 192, Subparts D and E Standard below which closure control(s) are not necessary
LLD - method detection limit

Table 4.7-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Magnesium Chip Burn Site (IRP Site 1)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	17000
Arsenic	86 00	37
Barium	140000 00	150
Beryllium	30	0 88
Calcium	NA	130000
Cadmium	300 00	1 6
Cobalt	10000	28
Chromium (Total)	2800 00	27
Copper	70000	57
Iron	100000	49000
Potassium	NA	3300
Magnesium	NA	32000
Manganese	45000	1300
Sodium	NA	130
Nickel	3700 00	62
Lead	2800	19
Selenium	10000 00	0 7
Thallium	160	2 1
Vanadium	14000	75
Zinc	370000 00	180

Table 4.7-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Magnesium Chip Burn Site (IRP Site 1)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
Volatiles by SW8260		
Acetone	55000 00	0 74
Bromomethane	NA	0 089
Toluene	520 00	0 021
Methyl Ethyl Ketone	27000 00	0 82
Methylene Chloride	990 00	0 059
Semivolatiles by SW8270		
bis(2-Ethylhexyl)phthalate	860 00	0 2
TPH by M8015D		
PHC C16-C32	40000	62
PHC as Gasoline	8000	0 16

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Table 4.7-3

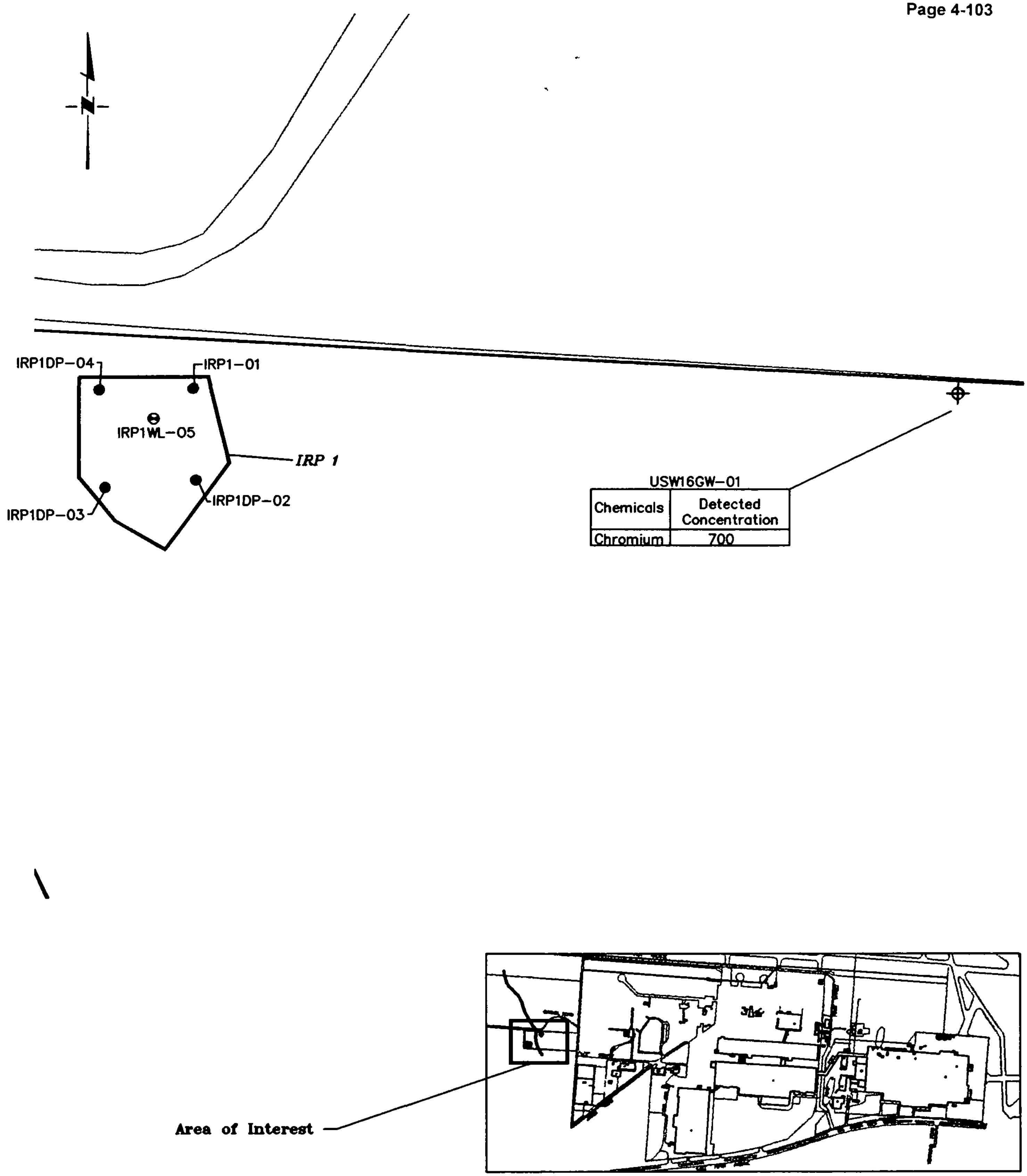
Summary of Analyte Concentrations for Groundwater Samples
Magnesium Chip Burn Site (IRP Site 1)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	IRP1GW-05N 2/23/99	USW16GW-01N 2/23/99
Analyte	**Inorganics (Total) by SW6010 (ug/L)**		
Barium	2000	170	82
Chromium (Total)	100	20 U	700
Copper	NA	40	35
Iron	NA	86	75
Manganese	NA	330	10 U
Analyte	**Volatiles by SW8260 (ug/L)**		
Chlorobenzene	NA	5 U	5 U
Analyte	**Semivolatiles by SW8270 (ug/L)**		
bis(2-Ethylhexyl)phthalate	NA	15 J	10 U
Analyte	**TPH by M8015 (ug/L)**		
PHC as Gasoline	NA	100 U	13 J

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter



Legend

- Existing Monitoring Well Sample Location
- Installed Monitoring Well Sample Location
- Direct Push Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.7-2

Magnesium Chip Burn Site IRP Site 1 Groundwater Sample Locations and Analyte Concentrations (ug/L)

On the basis of concentrations detected in associated blanks, methylene chloride results were qualified as non-detect for four soil samples and one groundwater sample.

Non-detect results for 3,3'-dichlorobenzidine were qualified R and rejected for five soil samples due to low percent recovery of laboratory control samples.

More than 61% of the TPH (GRO and DRO) data points for soil samples were estimated due to low percent recovery of matrix and surrogate spikes.

Non-detect results for selenium were qualified R and rejected for seven soil samples due to low percent recovery of matrix spikes and a high RPD between matrix spike and matrix spike duplicate results.

All groundwater points are useable. All soil sample data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at IRP Site 1:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	884	0	100%	25.9%	0.5%
SVOCs	462	5	98.9%	3.0%	0%
Pesticides/PCBs	196	0	100%	0%	0%
TPH (GRO and DRO)	26	0	100%	61.6%	0%
Inorganics	286	7	97.6%	40.5%	0%
Thorium	39	0	100%	0%	2.9%
Groundwater					
VOCs	136	0	100%	0.7%	0.7%
SVOCs	132	0	100%	0.8%	0%
TPH (GRO and DRO)	4	0	100%	25%	0%
Inorganics	44	0	100%	4.5%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.7.5 Recommendations for Further Action

As discussed in Section 4.7.3, chromium was detected in groundwater at a concentration exceeding its VAP generic unrestricted potable use standard.

Since previous samples collected from monitoring well USW16 did not exhibit elevated concentrations of chromium or any other inorganic compound, there is not enough evidence to identify the source of the chromium.

Semiannual sampling of the two monitoring wells at IRP Site 1 is recommended for a period of two years. The additional groundwater sampling will determine whether a continuous source of chromium is contributing to the groundwater at the site. On the basis of this determination, either a baseline risk assessment or further sampling will be conducted.

Since groundwater sampling analytical results indicate one chemical of concern exceeding the unrestricted potable use standards, there are two choices. The first choice is to use institutional or engineering controls to prevent human exposure to chemicals of concern or to remediate groundwater. The second choice is to classify the groundwater. On the basis of groundwater classification, a different set of cleanup requirements will be determined.

IRP Site 1 is designated Category 7.

4.8 IRP SITE 2 – COAL PILE LEACHATE SITE

IRP Site 2, the Coal Pile Leachate Site, located adjacent to the boiler house, was used for coal storage from 1941 to 1994. Leachate containing sulfuric acid, ammonia, and copper had periodically entered Mason's Run until 1979 when an underground drainage system leading to a collection sump was installed. The leachate was pumped from the sump to the onsite IWTP where it was neutralized and discharged to the sanitary sewer (Reference 50).

Until the mid-1980s, coal was stored on native soil in an area approximately 75 feet by 50 feet in size. Leachate from the coal pile containing sulfuric acid, ammonia, and copper had periodically entered Mason's Run downgradient of the coal pile until 1979 when an underdrain system below the coal pile was installed. The underdrain system consists of underground piping and concrete curbing that extends approximately 8 feet bgs on the western side of the coal pile storage area. The concrete curbing is approximately 3 feet wide and 8 inches above ground. The curbing above and below ground act as a barrier and channel the leachate through the piping and into the leachate collection tank. The leachate collection tank is located approximately 25 feet from the blowdown scrubber reservoir (an in-ground, open concrete tank with a capacity of approximately 2,000 gallons). The tank was constructed of concrete and had a capacity of approximately 30,000 gallons. The leachate was pumped through a pipe (Process Sewers) to the IWTP where it was neutralized and then discharged to the sanitary sewer.

4.8.1 Site Summary

Five soil borings and one groundwater monitoring well (PG -201) were installed during the IRP Phase II, Stage 1 investigation (Reference 53). Five soil samples were collected from the borings at depths between 8.5 and 15 feet bgs. Soil samples were analyzed for selected metals, sulfate and total organic halogens (TOX). A groundwater sample was collected and analyzed for oil and grease, total organic carbon (TOC), TOX, selected metals, and total dissolved solid (TDS). A duplicate groundwater sample was collected for sulfate and TDS analyses.

Soil samples indicated manganese (maximum 7.53 parts per million (ppm)), sulfate (maximum 22.0 ppm) and TOX (maximum 20.0 ppm) (Reference 53). Groundwater samples indicated manganese (0.113 ppm) was the only constituent detected at levels exceeding USEPA secondary drinking water standard.

Soil samples and a groundwater sample were obtained at this site as part of the base-wide USGS surface water and groundwater monitoring program established in 1996. Soil boreholes USB11, USB12, USB13, and USB1302 were drilled and soil was sampled at selected intervals. One groundwater monitoring well (USW13) was installed and groundwater was sampled. Soil and groundwater samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and total metals. Soil sampling and monitoring well installation was completed from November 11 to December 10, 1996. Groundwater sampling was conducted on December 16-17, 1996 (Reference 220).

Soil samples from boreholes USB11, USB12, USB13, and USB1302 indicated 1,1,1-trichloroethane (1,1,1-TCA) from borehole USB12 at 5 feet bgs. No other contaminants were reported in the soil samples from these boreholes.

Groundwater samples indicate no VOC, SVOC, or Pesticide/PCB in the groundwater at monitoring well USW13. The USGS report provides average concentrations for metals detected in the groundwater samples. The average concentrations are as follows: four analytes were detected in all wells sampled: barium (0.02 mg/L), calcium (124 mg/L), magnesium (46.1 mg/L), and manganese (0.08 mg/L). Iron (2.13 mg/L) and sodium (20.3 mg/L) were detected in at least 80 percent of the wells sampled. Aluminum (0.38 mg/L), cadmium (0.0083 mg/L), chromium (1.4 mg/L), molybdenum (0.03 mg/L), potassium (18.1 mg/L), lead (2.2 mg/L), and zinc (0.04 mg/L) were detected in 30 percent (or less) of the samples. Antimony, beryllium, cobalt, copper, nickel, selenium, silver, thallium, and vanadium were not detected in any of the wells sampled (Reference 249).

Groundwater was also analyzed for five common anions. Chloride (with an average concentration of 20.6 mg/L) and sulfate (161 mg/L) were present in each well. Fluoride was found in 40 percent of the wells with an average concentration of 0.78 mg/L; nitrate (as N) was detected in 10 percent of the wells, with an average concentration of 5.8 mg/L. Orthophosphate (as P) was not found in any of the wells. Five groundwater samples were analyzed for cyanide, with no concentrations found above the detection limit (Reference 249).

The RCRA Facilities Assessment (RFA) suggested an RCRA Facilities Investigation (RFI) of the underdrain system be done to address potential soil and groundwater contamination. The underdrain system in relation to soil and groundwater samples is not addressed in IRP documents.

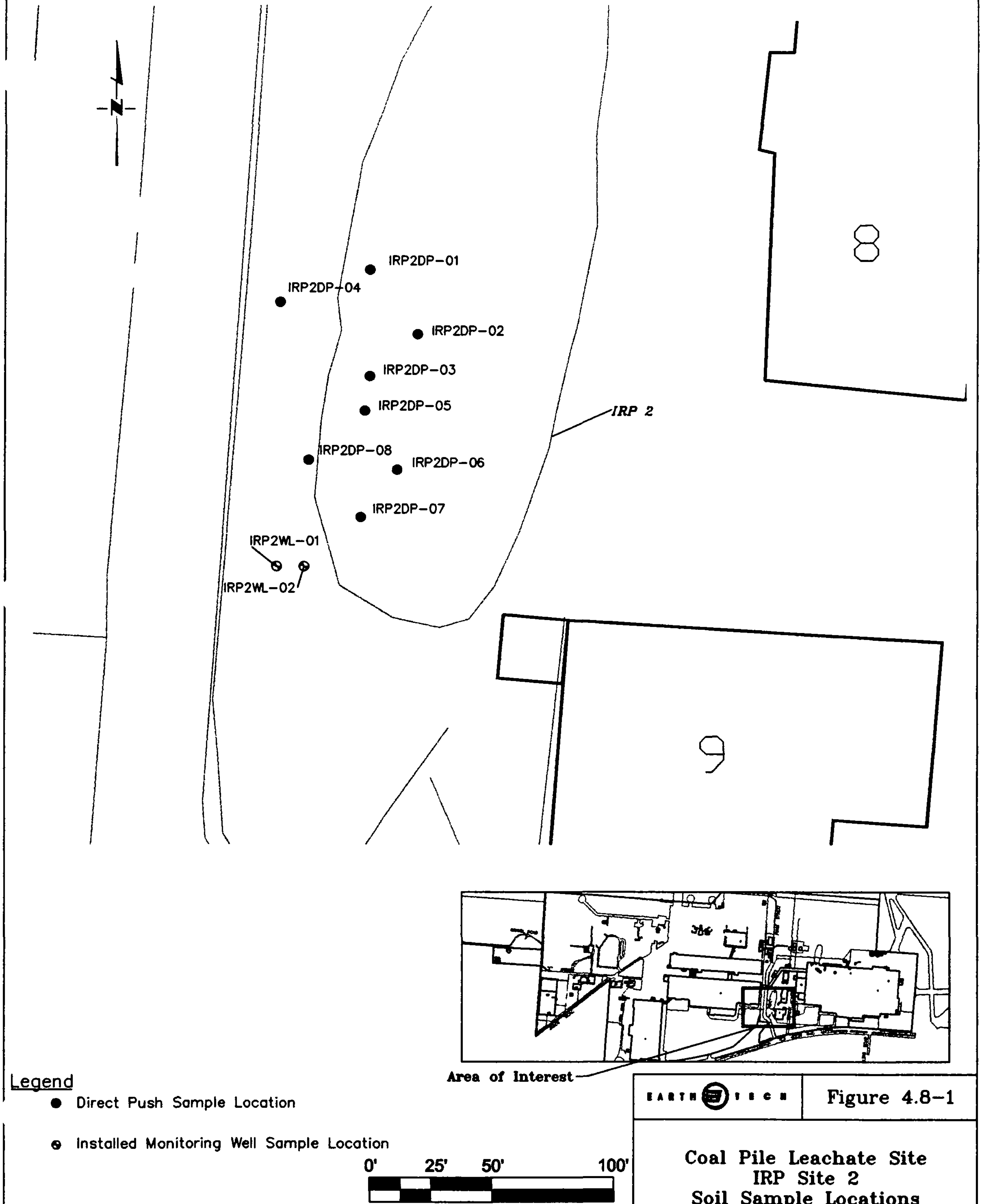
IRP documents indicate soil samples were obtained in locations upgradient of the former coal pile location. It does not appear that soil samples were taken downgradient of the coal pile toward Mason's Run. According to the site description, coal was stored on native soil for 38 years prior to the underdrain system construction.

It appears from the soil boring report (Reference 223) that some soil samples were taken below a shallow water bearing unit (and possible leachate transport zone) in a dry soil matrix. It is recommended that the value of these soil sampling locations be evaluated in regard to leachate migration detection. The soil boring report (Reference 223) also indicates that some soil samples obtained during the Phase II Stage 1 Investigation were split with the USAF OEHL/SA in the field. It is recommended that these split soil sample results be reported, if available. The soil sample depths associated with the USGS boring installation should be provided and evaluated.

A shallow water bearing zone at the site is inferred from the boring report. Borehole 4 could not be sampled for soil at the targeted ten-foot level "as the sample was mostly water" (Reference 223). However, groundwater monitoring well PG-201 is screened 28 to 38 feet bgs. The depth of groundwater monitoring well USW13 installed by USGS is not available in the current report.

4.8.2 Field Activities Conducted

Eight boreholes were advanced at this location using direct push technology. Each borehole was continuously sampled every five feet until groundwater or refusal. Fourteen direct push soil samples were collected at IRP Site 2 and analyzed for SVOCs and metals. A shallow groundwater monitoring well, IRP201, was installed at 17 feet bgs and a deep monitoring well, IRP202, at 37 feet bgs; soil and groundwater samples were collected. Soil samples were collected and analyzed for SVOCs, and metals. Groundwater samples were also collected from 2 existing monitoring wells, USW13 and PG201. All groundwater samples were analyzed for SVOCs and metals. Sample locations are shown in Figure 4.8-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.



EARTH TECH

Figure 4.8-1

Coal Pile Leachate Site
IRP Site 2
Soil Sample Locations

29179.4.6-9.DWG/PLT

Number of Samples Collected at IRP Site 2				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other
Existing Wells	--	2	--	--
New Wells	10	2	--	--
Borehole	--	--	--	--
Direct Push Hole	14	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Semivolatile organic compounds (SW3550/8270), metals (SW3050/6010), and soil moisture (ASTM D2216).

(2) Groundwater analytical suite: semivolatile organic compounds (SW3510/8270),and metals (SW3005/6010).

4.8.3 Results

Numerous inorganics and SVOCs were detected in soil samples collected at IRP Site 2; concentrations are presented in Table 4.8-1. Table 4.8-2 presents a comparison between the maximum site concentrations (with the exception of beryllium) and the adjusted VAP standards. Beryllium was detected in the 10-12 feet bgs interval in borehole IRP201WL at a concentration of 990 mg/kg. All other detections (24) of beryllium at IRP Site 2 were approximately 1 mg/kg. Since the detection of 990 mg/kg seems to be an outlier, the 95% confidence interval was calculated to determine whether the elevated concentration could potentially require further study or remediation. The 95% confidence limit is 5.37 mg/kg, a concentration less than the generic standard of 30 mg/kg. This value was included in Table 4.8-2, and the adjusted VAP standards for the other detected analytes were calculated. Because the elevated beryllium concentration was detected one time in an isolated interval, there appears to be no threat to human health or the environment.

Ten boreholes were advanced at IRP Site 2; depths ranged from 8 to 37 feet bgs. The soils encountered ranged from yellow brown silty clay to clay with gravel and a layer of sand mixed with black coal located just above the initial groundwater zone. Groundwater was encountered between 5 and 37 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 7.38×10^{-7} cm/s was reported at nearby UST 9-91.

Numerous inorganics and SVOCs were detected in the groundwater samples collected at the wells at IRP Site 2; concentrations are presented in Table 4.8-3. There were no detected concentrations that exceeded the respective VAP unrestricted potable use standard. Figure 4.8-2 shows the location of the groundwater sample locations.

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples
Coal Pile Leachate Site (IRP Site 2)

Sample ID Date Sampled Depth	IRP2DP-0101N 2/16/99 4 - 8 ft bgs	IRP2DP-0102N 2/16/99 8 - 12 ft bgs	IRP2DP-0102D 2/16/99 8 - 12 ft bgs	IRP2DP-0201N 2/16/99 4 - 8 ft bgs	IRP2DP-0202N 2/16/99 8 - 11 ft bgs	IRP2DP-0301N 2/16/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	13000	14000	13000	10000	17000	22000
Arsenic	11	9 9	9 9	12	5 5	11
Barium	110	200	120	63	210	220
Beryllium	0 75	0 98	0 69	0 68	1	1 1
Cadmium	0 88	0 78	0 62 U	0 95	0 83	0 86
Chromium (Total)	18	19	17	15	21	26
Cobalt	15	13	13	16	12	16
Copper	34	29	19	31	37	32
Iron	36000	40000	33000	51000	33000	39000
Lead	15	19	19	17	21	18
Manganese	300	510	500	680	370	320
Nickel	42	35	22	37	35	41
Selenium	0 84 S	1 2 U	0 61 S	0 62 S	0 51 U	1 3 U
Thallium	0 75	0 42	0 58	0 81	0 32 U	0 35
Vanadium	43	42	35	36	43	59
Zinc	130	120	82	120	120	120
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
2-Methylnaphthalene	200 U	200 U	200 U	200 U	210 U	210 U
Benzo(a)anthracene	200 U	140 J	200 U	200 U	210 U	210 U
Benzo(a)pyrene	200 U	180 J	200 U	200 U	210 U	210 U
Benzo(b)fluoranthene	200 U	170 J	200 U	200 U	210 U	210 U
Benzo(g,h,i)perylene	200 U	130 J	200 U	200 U	210 U	210 U

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Coal Pile Leachate Site (IRP Site 2)

Sample ID Date Sampled Depth	IRP2DP-0101N 2/16/99 4 - 8 ft bgs	IRP2DP-0102N 2/16/99 8 - 12 ft bgs	IRP2DP-0102D 2/16/99 8 - 12 ft bgs	IRP2DP-0201N 2/16/99 4 - 8 ft bgs	IRP2DP-0202N 2/16/99 8 - 11 ft bgs	IRP2DP-0301N 2/16/99 4 - 8 ft bgs
Benzo(k)fluoranthene	200 U	130 J	200 U	200 U	210 U	210 U
bis(2-Ethylhexyl)phthalate	200 U	200 U	200 U	200 U	210 U	64 J
Chrysene	200 U	220 J	200 U	200 U	210 U	210 U
Fluoranthene	200 U	320 J	200 U	200 U	59 J	210 U
Indeno(1,2,3-c,d)pyrene	200 U	120 J	200 U	200 U	210 U	210 U
Naphthalene	200 U	200 U	200 U	200 U	210 U	210 U
Phenanthrene	200 U	120 J	200 U	200 U	210 U	210 U
Pyrene	200 U	250 J	200 U	200 U	46 J	210 U

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples
Coal Pile Leachate Site (IRP Site 2)

Sample ID Date Sampled Depth	IRP2DP-0401N 2/16/99 0 - 4 ft bgs	IRP2DP-0401D 2/16/99 0 - 4 ft bgs	IRP2DP-0501N 2/16/99 0 - 4 ft bgs	IRP2DP-0601N 2/16/99 0 - 4 ft bgs	IRP2DP-0701N 2/16/99 0 - 4 ft bgs	IRP2DP-0702N 2/16/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	18000	20000	15000	16000	25000	12000
Arsenic	23	9 9	20	16	14	21
Barium	140	240	170	160	200	140
Beryllium	1	0 89	0 85	0 82	1 1	0 68
Cadmium	0 94	0 63 U	0 8	0 74	0 61 U	0 94
Chromium (Total)	23	22	19	20	28	15
Cobalt	18	13	17	14	16	14
Copper	35	27	34	30	35	36
Iron	52000	38000	51000	37000	54000	79000
Lead	18	15	19	19	21	23
Manganese	390	440	450	280	120	350
Nickel	49	36	46	34	38	40
Selenium	1 2 U	0 54 S	1 2 U	0 88 S	0 64 S	0 66 S
Thallium	0 33	0 52	0 67	0 7	0 38	0 61
Vanadium	56	47	41	42	59	40
Zinc	140	120	160	120	120	110
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
2-Methylnaphthalene	200 U	210 U	200 U	190 U	200 U	190 U
Benzo(a)anthracene	200 U	210 U	200 U	44 J	200 U	190 U
Benzo(a)pyrene	200 U	210 U	200 U	190 U	200 U	190 U
Benzo(b)fluoranthene	200 U	210 U	200 U	190 U	200 U	190 U
Benzo(g,h,i)perylene	200 U	210 U	200 U	190 U	200 U	190 U

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Coal Pile Leachate Site (IRP Site 2)

Sample ID Date Sampled Depth	IRP2DP-0401N 2/16/99 0 - 4 ft bgs	IRP2DP-0401D 2/16/99 0 - 4 ft bgs	IRP2DP-0501N 2/16/99 0 - 4 ft bgs	IRP2DP-0601N 2/16/99 0 - 4 ft bgs	IRP2DP-0701N 2/16/99 0 - 4 ft bgs	IRP2DP-0702N 2/16/99 4 - 8 ft bgs
Benzo(k)fluoranthene	200 U	210 U	200 U	190 U	200 U	190 U
bis(2-Ethylhexyl)phthalate	200 U	210 U	200 U	190 U	47 J	190 U
Chrysene	200 U	210 U	200 U	84 J	200 U	190 U
Fluoranthene	200 U	210 U	200 U	100 J	47 J	190 U
Indeno(1,2,3-c,d)pyrene	200 U	210 U	200 U	190 U	200 U	190 U
Naphthalene	200 U	210 U	200 U	190 U	200 U	190 U
Phenanthrene	200 U	210 U	200 U	110 J	200 U	190 U
Pyrene	200 U	210 U	200 U	100 J	39 J	190 U

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples
Coal Pile Leachate Site (IRP Site 2)

Sample ID Date Sampled Depth	IRP2DP-0703N 2/16/99 8 - 12 ft bgs	IRP2DP-0703D 2/16/99 8 - 12 ft bgs	IRP2DP-0704N 2/16/99 12 - 16 ft bgs	IRP2DP-0801N 2/16/99 4 - 8 ft bgs	IRP2DP-0801D 2/16/99 4 - 8 ft bgs	IRP2DP-0802N 2/16/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	21000	21000	15000	21000	9000	15000
Arsenic	7 3	3 1	7 5	8 8	14	11
Barium	230	230	120	250	81	400
Beryllium	1 1	1 1	0 82	1 2	0 56 U	1
Cadmium	0 62 U	0 63 U	0 64	0 64 U	0 99	1 4
Chromium (Total)	25	24	21	24	12	18
Cobalt	15	9 5	14	15	12	21
Copper	27	28	31	25	28	39
Iron	40000	30000	43000	42000	32000	66000
Lead	19	18	17	19	14	18
Manganese	390	220	210	140	300	530
Nickel	34	33	41	35	36	48
Selenium	0 25 U	1 8 S	0 57 S	0 6 S	2 2 S	0 74 S
Thallium	0 31 U	0 34	0 6	0 47	0 71	0 67
Vanadium	52	48	36	55	30	47
Zinc	120	120	140	130	120	160
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
2-Methylnaphthalene	200 U	210 U	210 U	210 U	180 U	110 J
Benzo(a)anthracene	200 U	210 U	210 U	210 U	180 U	47 J
Benzo(a)pyrene	200 U	210 U	210 U	210 U	180 U	40 J
Benzo(b)fluoranthene	200 U	210 U	210 U	210 U	180 U	47 J
Benzo(g,h,i)perylene	200 U	210 U	210 U	210 U	180 U	210 U

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Coal Pile Leachate Site (IRP Site 2)

Sample ID Date Sampled Depth	IRP2DP-0703N 2/16/99 8 - 12 ft bgs	IRP2DP-0703D 2/16/99 8 - 12 ft bgs	IRP2DP-0704N 2/16/99 12 - 16 ft bgs	IRP2DP-0801N 2/16/99 4 - 8 ft bgs	IRP2DP-0801D 2/16/99 4 - 8 ft bgs	IRP2DP-0802N 2/16/99 8 - 12 ft bgs
Benzo(k)fluoranthene	200 U	210 U	210 U	210 U	180 U	210 U
bis(2-Ethylhexyl)phthalate	200 U	210 U	210 U	210 U	82 J	46 J
Chrysene	200 U	210 U	210 U	210 U	180 U	74 J
Fluoranthene	200 U	210 U	210 U	210 U	180 U	82 J
Indeno(1,2,3-c,d)pyrene	200 U	210 U	210 U	210 U	180 U	210 U
Naphthalene	200 U	210 U	210 U	210 U	180 U	66 J
Phenanthrene	200 U	210 U	210 U	210 U	180 U	200 J
Pyrene	200 U	210 U	210 U	210 U	180 U	100 J

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples
Coal Pile Leachate Site (IRP Site 2)

Sample ID Date Sampled Depth	IRP201WL-01N 2/16/99 5 - 7 ft bgs	IRP201WL-02N 2/16/99 10 - 12 ft bgs	IRP201WL-03N 2/16/99 15 - 17 ft bgs	IRP201WL-03D 2/16/99 15 - 17 ft bgs	IRP202WL-01N 2/16/99 5 - 7 ft bgs	IRP202WL-02N 2/16/99 10 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	24000	18000	10000	9400	11000	11000
Arsenic	5 9	22	8	5 3	16	15
Barium	210	120	85	97	91	120
Beryllium	1 2	990	0 58	0 56 U	1 1	1 1
Cadmium	0 7	0 64 U	0 62	0 56 U	0 61 U	0 62 U
Chromium (Total)	27	24	13	12	17	17
Cobalt	8 2	14	11	11	14	12
Copper	38	35	29	25	35	38
Iron	27000	39000	29000	29000	41000	44000
Lead	24	17	32	9 1	16	20
Manganese	140	300	340	330	350	520
Nickel	32	48	30	27	49	51
Selenium	1 3 U	1 3 U	1 1 U	1 1 U	0 98 S	0 49 U
Thallium	0 45 U	1 2 S	0 69 S	0 79 S	1 1 S	1 3 S
Vanadium	58	50	28	24	51	77
Zinc	140	140	94	85	130	140
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
2-Methylnaphthalene	220 U	210 U	190 U	180 U	200 U	200 U
Benzo(a)anthracene	220 U	210 U	190 U	180 U	200 U	200 U
Benzo(a)pyrene	220 U	210 U	190 U	180 U	200 U	200 U
Benzo(b)fluoranthene	220 U	210 U	190 U	180 U	200 U	200 U
Benzo(g,h,i)perylene	220 U	210 U	190 U	180 U	200 U	200 U

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Coal Pile Leachate Site (IRP Site 2)

Sample ID Date Sampled Depth	IRP201WL-01N 2/16/99 5 - 7 ft bgs	IRP201WL-02N 2/16/99 10 - 12 ft bgs	IRP201WL-03N 2/16/99 15 - 17 ft bgs	IRP201WL-03D 2/16/99 15 - 17 ft bgs	IRP202WL-01N 2/16/99 5 - 7 ft bgs	IRP202WL-02N 2/16/99 10 - 12 ft bgs
Benzo(k)fluoranthene	220 U	210 U	190 U	180 U	200 U	200 U
bis(2-Ethylhexyl)phthalate	130 J	51 J	98 J	51 J	83 J	57 J
Chrysene	220 U	210 U	190 U	180 U	200 U	200 U
Fluoranthene	220 U	210 U	190 U	180 U	200 U	200 U
Indeno(1,2,3-c,d)pyrene	220 U	210 U	190 U	180 U	200 U	200 U
Naphthalene	220 U	210 U	190 U	180 U	200 U	200 U
Phenanthrene	220 U	210 U	190 U	180 U	200 U	200 U
Pyrene	220 U	210 U	190 U	180 U	200 U	200 U

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples
Coal Pile Leachate Site (IRP Site 2)

Sample ID / Date Sampled / Depth	IRP202WL-03N 2/16/99 15 - 17 ft bgs	IRP202WL-04N 2/16/99 20 - 22 ft bgs	IRP202WL-05N 2/16/99 25 - 27 ft bgs	IRP202WL-06N 2/16/99 30 - 32 ft bgs	IRP202WL-07N 2/16/99 35 - 37 ft bgs	IRP202WL-07D 2/16/99 35 - 37 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	7600	7000	9100	13000	4500	3600
Arsenic	11	11	10	13	16	11
Barium	56	40	73	100	42	41
Beryllium	0 6	0 55 U	0 72	0 96	0 58 U	0 56 U
Cadmium	0 56 U	0 55 U	0 56 U	0 6 U	0 58 U	4 3
Chromium (Total)	11	9 4	12	17	8 1	6 2
Cobalt	8 4	7 9	9 2	13	5 2	4
Copper	22	21	26	26	26	20
Iron	23000	24000	27000	31000	15000	14000
Lead	9 6	8 4	8 3	11	11	8 7
Manganese	300	280	290	320	300	290
Nickel	29	26	30	39	25	20
Selenium	1 1 S	0 87 S	0 79 S	4 8 U	2 3 U	1 2 S
Thallium	0 94 S	1 S	0 87 S	0.77 S	1 3 S	0 7 S
Vanadium	23	22	27	29	28	37
Zinc	64	65	71	84	78	300
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
2-Methylnaphthalene	190 U	180 U	180 U	200 U	190 U	180 U
Benzo(a)anthracene	190 U	180 U	180 U	200 U	190 U	180 U
Benzo(a)pyrene	190 U	180 U	180 U	200 U	190 U	180 U
Benzo(b)fluoranthene	190 U	180 U	180 U	200 U	190 U	180 U
Benzo(g,h,i)perylene	190 U	180 U	180 U	200 U	190 U	180 U
Benzo(k)fluoranthene	190 U	180 U	180 U	200 U	190 U	180 U

Table 4.8-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Coal Pile Leachate Site (IRP Site 2)

Sample ID Date Sampled Depth	IRP202WL-03N 2/16/99 15 - 17 ft bgs	IRP202WL-04N 2/16/99 20 - 22 ft bgs	IRP202WL-05N 2/16/99 25 - 27 ft bgs	IRP202WL-06N 2/16/99 30 - 32 ft bgs	IRP202WL-07N 2/16/99 35 - 37 ft bgs	IRP202WL-07D 2/16/99 35 - 37 ft bgs
bis(2-Ethylhexyl)phthalate	100 J	48 J	50 J	99 J	88 J	60 J
Chrysene	190 U	180 U	180 U	200 U	190 U	180 U
Fluoranthene	190 U	180 U	180 U	200 U	190 U	180 U
Indeno(1,2,3-c,d)pyrene	190 U	180 U	180 U	200 U	190 U	180 U
Naphthalene	190 U	180 U	180 U	200 U	190 U	180 U
Phenanthrene	190 U	180 U	180 U	200 U	190 U	180 U
Pyrene	190 U	180 U	180 U	200 U	190 U	180 U

Note: Sample IDs IRP2DP 0102D, IRP2DP-0401D, IRP2DP-0703D, IRP2DP-0801D, IRP201WL-03D and IRP202WL-07D are field duplicates.

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.8-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Coal Pile Leachate Site (IRP Site 2)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
Inorganics by SW6010		
Aluminum	1000000 00	25000
Arsenic	86 00	23
Barium	140000 00	400
Beryllium	30	5 37
Calcium	NA	120000
Cadmium	300 00	4 3
Cobalt	10000	21
Chromium (Total)	2800 00	28
Copper	70000	39
Iron	100000	79000
Potassium	NA	3700
Magnesium	NA	45000
Manganese	45000	680
Sodium	NA	180
Nickel	3700 00	51
Lead	NA	32
Selenium	10000 00	2 2
Thallium	160	1 3
Vanadium	14000	77
Zinc	370000 00	300

Table 4.8-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Coal Pile Leachate Site (IRP Site 2)		
Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
bis(2-Ethylhexyl)phthalate	860 00	0 13
Benzo(a)anthracene	31 00	0 14
Benzo(a)pyrene	3 10	0 18
Benzo(b)fluoranthene	31 00	0 17
Benzo(g,h,i)perylene	9100 00	0 13
Benzo(k)fluoranthene	310 00	0 13
Chrysene	3100 00	0 22
Fluoranthene	12000 00	0 32
Indeno(1,2,3-c,d)pyrene	31 00	0 12
2-Methylnaphthalene	76000 00	0 11
Naphthalene	22000 00	0 066
Phenanthrene	91000 00	0 2
Pyrene	9100 00	0 25

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Table 4.8-3

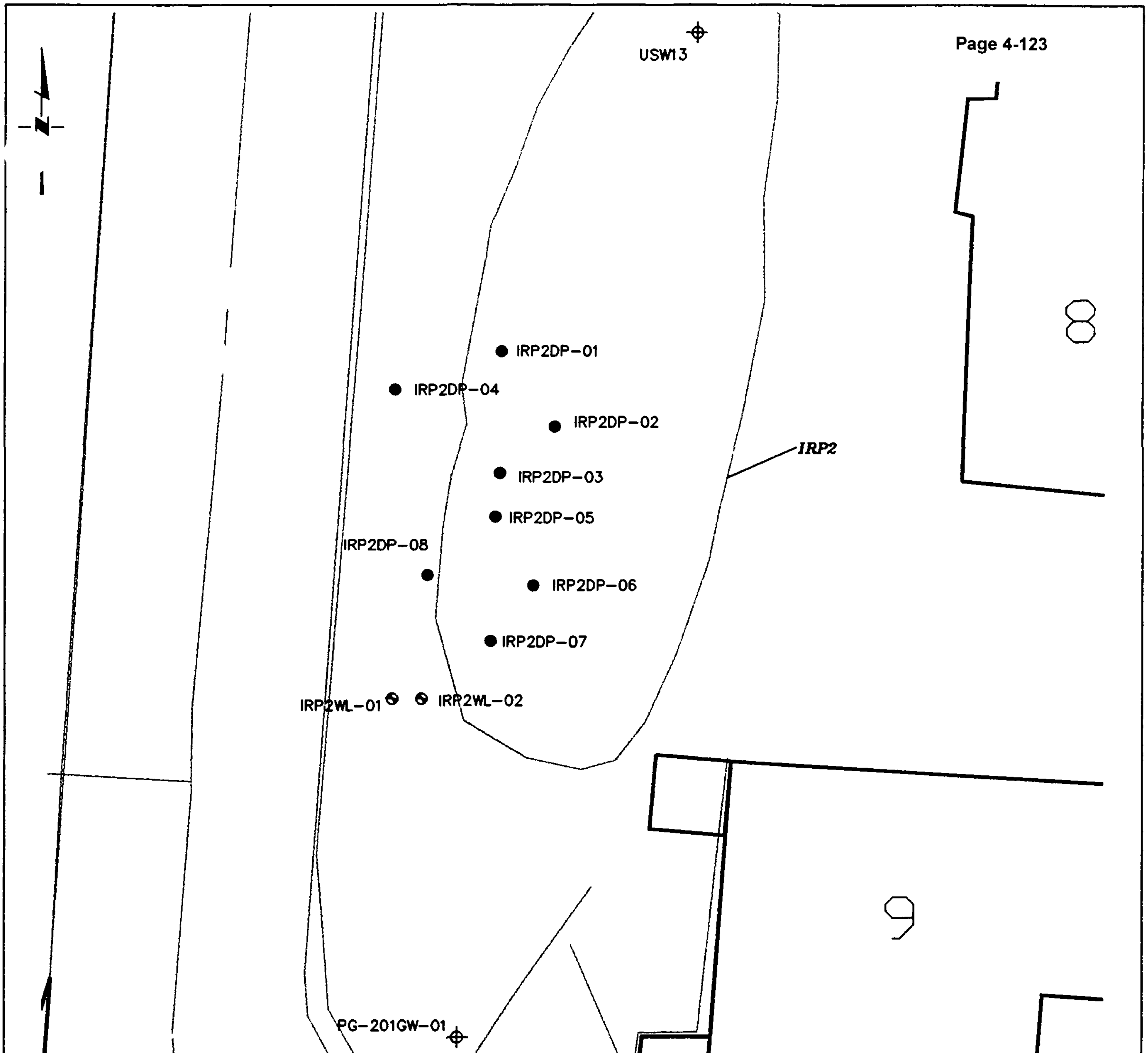
Summary of Analyte Concentrations for Groundwater Samples
Coal Pile Leachate Site (IRP Site 2)

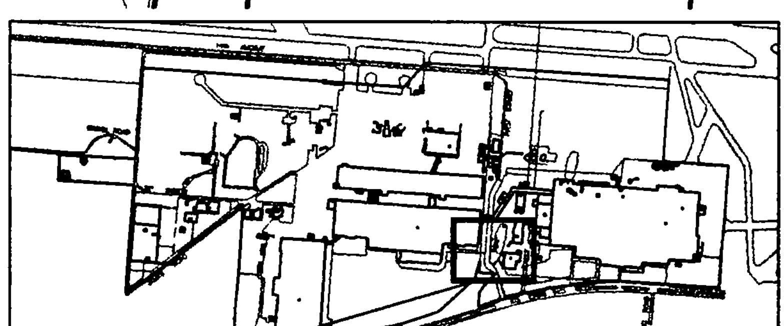
Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	IRP201GW-01N 2/23/99	IRP202GW-01N 2/22/99	PG201GW-01N 2/22/99	USW13GW-01N 2/23/99
Analyte	**Inorganics (Total) by SW6010 (ug/L)**				
Barium	2000	35	1200	68	32
Iron	NA	50	860	320	1200
Manganese	NA	3300	110	17	6700
Zinc	4700	20 U	20 U	20 U	26
Analyte	**Semivolatiles by SW8270 (ug/L)**				
bis(2-Ethylhexyl)phthalate	NA	10 U	10 U	48	10 U
Diethylphthalate	NA	1 7 J	1 7 J	10 U	10 U

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter





Legend
- Direct Push Sample Location
- Installed Monitoring Well Sample Location
- Existing Monitoring Well Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.8-2

IRP Site 2
Coal Pile Leachate Site
Groundwater Sample Locations

4.8.4 Data Validation Summary

Twenty-four soil samples, six soil duplicates and four groundwater samples were collected at IRP Site 2 and were analyzed for SVOCs and inorganics. Non-detect results for 3,3'-dichlorobenzidine were qualified R and rejected for thirteen soil samples due to low percent recovery of matrix spikes and laboratory control samples and a high RPD between matrix spike and matrix spike duplicate results.

All groundwater samples are useable. All soil data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at IRP Site 2:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	1980	13	99.3%	8.3%	0%
Inorganics	660	0	100%	32.6%	0%
Groundwater					
SVOCs	264	0	100%	1.6%	0%
Inorganics	88	0	100%	4.5%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.8.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. IRP Site 2 is recommended for Category 4 designation.

4.9 IRP SITE 6 – RUBBLE DISPOSAL SITE

IRP Site 6, the Rubble Disposal Site, is located in the western portion of the main industrial parcel. It is west of Turkey Run, in an undeveloped area.

4.9.1 Site Summary

The Rubble Disposal Site was used for the disposal of concrete rubble from buildings damaged by a tornado in 1972. The site was excavated, and the concrete was buried and backfilled.

4.9.2 Field Activities Conducted

Five boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Seven direct push soil samples and one groundwater sample were collected at IRP Site 6 and analyzed for VOCs, SVOCs, metals, pesticides, PCBs, GRO and DRO. A sample was collected for vertical conductivity determination. Sample locations are shown in Figure 4.9-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at IRP Site 6				
Sampling Point	**Soil(1)**	**Groundwater(2)**	**Soil Gas**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	7	1	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

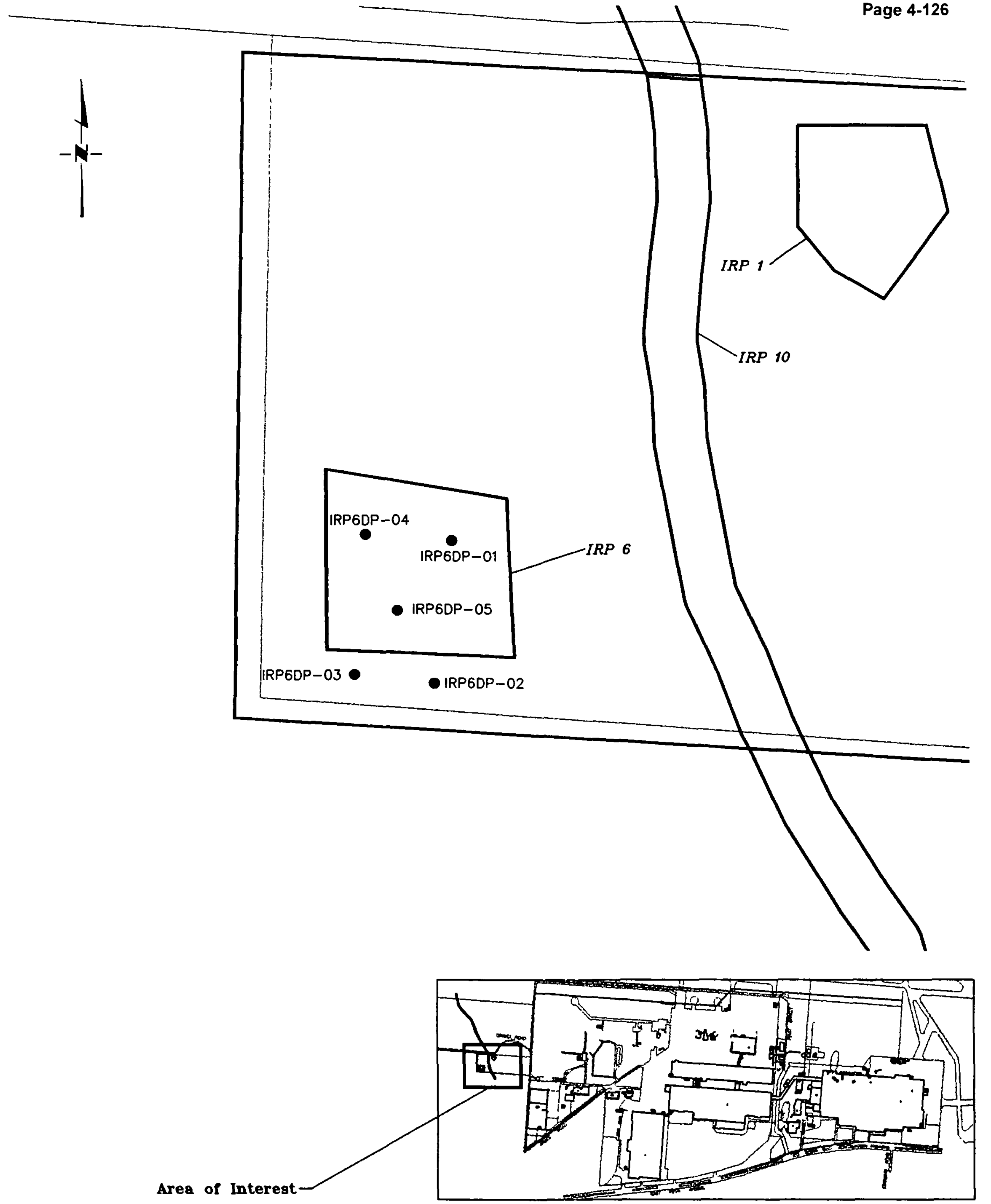
(1) Soil analytical suite: Metals (SW3050/6010), volatile organic compounds (SW8260), diesel range organics, gasoline range organics (modified SW8015), PCBs/pesticides (SW3550/8080), semivolatile compounds (SW5030/8270), and soil moisture (ASTM D2216).

(2) Groundwater analytical suite: Metals (filtered and unfiltered) (SW3005/6010), volatile organic compounds (SW8260), diesel range organics, gasoline range organics (modified SW8015), PCBs/pesticides (SW8080), and semivolatile compounds (SW3510/8270).

4.9.3 Results

Numerous inorganics, VOCs, SVOCs and TPH were detected in soil samples collected at IRP Site 6; concentrations are presented in Table 4.9-1. Table 4.9-2 presents a comparison between the maximum concentration and the adjusted VAP standard for each detected analyte. No concentrations exceeded their respective adjusted VAP standard.

Soils encountered at IRP Site 6 included yellow brown silty clay with a layer of fill and asphalt on the first four feet. A vertical conductivity value of 1.7×10^{-8} cm/s was reported for sample IRP6VP-05 collected at 4-6 feet bgs. This value is relatively low, and indicates slight probability of leaching potential.



Legend
● Direct Push Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.9-1

Rubble Disposal Site
IRP Site 6
Soil Sample Locations

29179.4.6-9.DWG/PLT

Table 4.9-1

Summary of Analyte Concentrations for Soil Samples
Rubble Disposal Area (IRP Site 6)

Sample ID Date Sampled Depth	IRP6DP-0101N 2/23/99 4 - 8 ft bgs	IRP6DP-0102N 2/23/99 8 - 12 ft bgs	IRP6DP-0201N 2/23/99 4 - 8 ft bgs	IRP6DP-0301N 2/23/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	14000	8900	18000	13000
Arsenic	5 6	9 5	8 1	15
Barium	110	48	170	200
Beryllium	1	0 57 U	0 9	0 93
Cadmium	0 73	0 57 U	0 83	1 4
Chromium (Total)	19	13	23	21
Cobalt	12	12	15	28
Copper	34	30	23	52
Iron	48000	28000	34000	68000
Lead	17	14	16	17
Manganese	440	220	740	1800
Nickel	34	40	35	67
Selenium	0 49 U	0 85 S	0 51 U	0.49 U
Thallium	0 46 S	1 9 S	0 6 S	1 2 J
Vanadium	41	27	37	52
Zinc	120	100	110	190
Analyte	**Volatiles by SW8260 (ug/kg)**			
Acetone	530 J	490 J	580 J	560 J
Chlorobenzene	490 U	430 U	540 U	490 U
Hexachlorobutadiene	490 U	430 U	540 U	490 U
Methyl Ethyl Ketone	560 J	520 J	650 J	590 J
Methylene Chloride	63 J	47 J	56 J	55 J

Table 4.9-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Rubble Disposal Area (IRP Site 6)

Sample ID Date Sampled Depth	IRP6DP-0101N 2/23/99 4 - 8 ft bgs	IRP6DP-0102N 2/23/99 8 - 12 ft bgs	IRP6DP-0201N 2/23/99 4 - 8 ft bgs	IRP6DP-0301N 2/23/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
Benzo(a)anthracene	200 U	190 U	210 U	200 U
Benzo(a)pyrene	200 U	190 U	210 U	200 U
Benzo(b)fluoranthene	200 U	190 U	210 U	200 U
Benzo(g,h,i)perylene	200 U	190 U	210 U	200 U
Benzo(k)fluoranthene	200 U	190 U	210 U	200 U
Chrysene	200 U	190 U	210 U	200 U
Fluoranthene	200 U	190 U	66	46
Hexachlorobutadiene	200 U	190 U	210 U	200 U
Indeno(1,2,3-c,d)pyrene	200 U	190 U	210 U	200 U
Phenanthrene	200 U	190 U	210 U	200 U
Pyrene	200 U	190 U	56	200 U
Analyte	**TPH by M8015D (ug/kg)**			
PHC as Gasoline	120 U	110 U	60 J	120 U
PHC C16-C32	7600 J	17000	17000	17000

Table 4.9-1

Summary of Analyte Concentrations for Soil Samples
Rubble Disposal Area (IRP Site 6)

Sample ID Date Sampled Depth	IRP6DP-0302N 2/23/99 8 - 12 ft bgs	IRP6DP-0401N 2/23/99 4 - 8 ft bgs	IRP6DP-0401D 2/23/99 4 - 8 ft bgs	IRP6DP-0501N 2/23/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	7700	10000	13000	10000
Arsenic	20	7.5	9.1	9
Barium	510	93	100	95
Beryllium	0.56 U	0.63 U	0.81	0.78
Cadmium	0.79	0.95	0.61 U	1.2
Chromium (Total)	11	15	18	17
Cobalt	11	11	11	21
Copper	29	30	31	39
Iron	30000	33000	34000	75000
Lead	15	17	16	16
Manganese	230	440	200	730
Nickel	34	32	34	49
Selenium	0.99 S	0.51 U	0.49 U	0.51 U
Thallium	1.6 S	0.67 S	0.87 S	0.55 S
Vanadium	24	32	35	35
Zinc	100	100	120	130
Analyte	**Volatiles by SW8260 (ug/kg)**			
Acetone	470 J	570 J	600 J	690 J
Chlorobenzene	420 U	510 U	550 U	610 U
Hexachlorobutadiene	37 J	510 U	550 U	610 U
Methyl Ethyl Ketone	500 J	650 J	650 J	740 J
Methylene Chloride	45 J	45 J	56 J	56 J

Table 4.9-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Rubble Disposal Area (IRP Site 6)

Sample ID Date Sampled Depth	IRP6DP-0302N 2/23/99 8 - 12 ft bgs	IRP6DP-0401N 2/23/99 4 - 8 ft bgs	IRP6DP-0401D 2/23/99 4 - 8 ft bgs	IRP6DP-0501N 2/23/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
Benzo(a)anthracene	930 U	390 J	85 J	210 U
Benzo(a)pyrene	930 U	410 J	89 J	210 U
Benzo(b)fluoranthene	930 U	460 J	84 J	210 U
Benzo(g,h,i)perylene	930 U	270 J	66 J	210 U
Benzo(k)fluoranthene	930 U	290 J	72 J	210 U
Chrysene	930 U	490 J	99 J	210 U
Fluoranthene	250	1100	220	210 U
Hexachlorobutadiene	930 U	1000 U	200 U	210 U
Indeno(1,2,3-c,d)pyrene	930 U	230 J	55 J	210 U
Phenanthrene	930 U	660 J	110 J	210 U
Pyrene	200	850 J	170 J	210 U
Analyte	**TPH by M8015D (ug/kg)**			
PHC as Gasoline	42 J	130 U	120 U	130 U
PHC C16-C32	56000	110000	14000	7900 J

Table 4.9-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Rubble Disposal Area (IRP Site 6)

Sample ID Date Sampled Depth	IRP6DP-0302N 2/23/99 8 - 12 ft bgs	IRP6DP-0401N 2/23/99 4 - 8 ft bgs	IRP6DP-0401D 2/23/99 4 - 8 ft bgs	IRP6DP-0501N 2/23/99 4 - 8 ft bgs

Note: Sample ID IRP6DP-0401D is a field duplicate

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.9-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Rubble Disposal Area (IRP Site 6)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	18000
Arsenic	86 00	20
Barium	140000 00	510
Beryllium	30	1
Calcium	NA	88000
Cadmium	300 00	1 4
Cobalt	10000	28
Chromium (Total)	2800 00	23
Copper	70000	52
Iron	100000	75000
Potassium	NA	2300
Magnesium	NA	22000
Manganese	45000	1800
Sodium	NA	100
Nickel	3700 00	67
Lead	2800	17
Selenium	10000 00	0 99
Thallium	160	1 9
Vanadium	14000	52
Zinc	370000 00	190

Table 4.9-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Rubble Disposal Area (IRP Site 6)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Volatiles by SW8260		
Acetone	55000 00	0 69
Hexachlorobutadiene	38	0 037
Methyl Ethyl Ketone	27000 00	0 74
Methylene Chloride	990 00	0 063
Semivolatiles by SW8270		
Benzo(a)anthracene	31 00	0 39
Benzo(a)pyrene	3 10	0 41
Benzo(b)fluoranthene	31 00	0 46
Benzo(g,h,i)perylene	9100 00	0 27
Benzo(k)fluoranthene	310 00	0 29
Chrysene	3100 00	0 49
Fluoranthene	12000 00	1 1
Indeno(1,2,3-c,d)pyrene	31 00	0 23
Phenanthrene	91000 00	0 66
Pyrene	9100 00	0 85
TPH by M8015D		
PHC C16-C32	40000	110
PHC as Gasoline	8000	0 06

Table 4.9-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Rubble Disposal Area (IRP Site 6)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Inorganics and TPH were detected in the groundwater sample collected at IRP Site 6; concentrations are presented in Table 4.9-3. Beryllium, cadmium, chromium, nickel and thallium were detected at concentrations exceeding the respective VAP generic unrestricted potable use standards. Figure 4.9-2 shows the location of the elevated concentrations.

4.9.4 Data Validation Summary

Seven soil samples, one soil duplicate and one groundwater sample were collected at IRP Site 6 and were analyzed for VOCs, SVOCs, pesticides/PCBs, TPH (GRO and DRO) and inorganics.

On the basis of concentrations detected in associated blanks, methylene chloride results were qualified as non-detect for eight soil samples and hexachlorobutadiene results for one soil sample (IRP6DP-0302N).

Pesticide results for the groundwater sample IRP6GW-01N were all estimated due to the low percent recovery of surrogate spikes.

More than 56% of the TPH (GRO and DRO) data points for soil samples and all groundwater data points for TPH (GRO and DRO) analysis were estimated due to low percent recovery of matrix and surrogate spikes.

All soil and groundwater samples are useable. The following provides a summary of data validation results for samples collected at IRP Site 6:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	554	0	100%	3.1%	1.7%
SVOCs	528	0	100%	7.5%	0%
Pesticides/PCBs	224	0	100%	2.2%	0%
TPH (GRO and DRO)	16	0	100%	56.3%	0%
Inorganics	176	0	100%	40.9%	0%
Groundwater					
VOCs	68	0	100%	0%	0%
SVOCs	66	0	100%	13.6%	0%
Pesticides/PCBs	28	0	100%	100%	0%
TPH (GRO and DRO)	2	0	100%	100%	0%
Inorganics	22	0	100%	4.5%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

Table 4.9-3

Summary of Analyte Concentrations for Groundwater Samples
Rubble Disposal Area (IRP Site 6)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	IRP6GW-01N 2/23/99
Analyte	**Inorganics (Total) by SW6010 (ug/L)**	
Aluminum	NA	210000
Arsenic	NA	8 9
Barium	2000	1500
Beryllium	4	11
Cadmium	5	30
Chromium (Total)	100	300
Cobalt	NA	220
Copper	NA	1100
Iron	NA	790000
Lead	NA	450
Manganese	NA	7500
Nickel	100	1000
Thallium	2	21
Vanadium	NA	740
Zinc	4700	3700
Analyte	**Volatiles by SW8260 (ug/L)**	
Chlorobenzene	NA	5 U
Analyte	**TPH by M8015 (ug/L)**	
PHC C16-C32	NA	340 J

Table 4.9-3

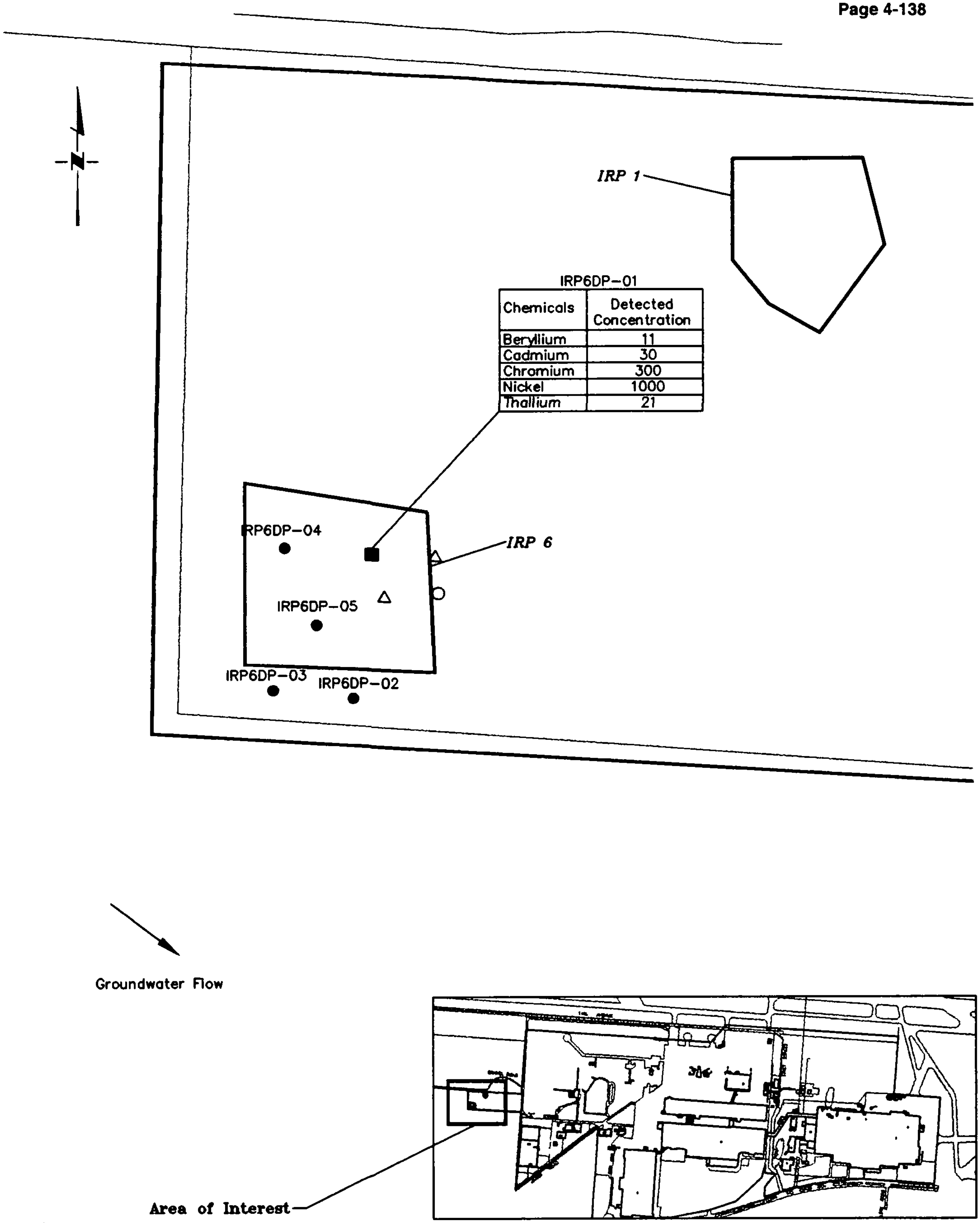
Summary of Analyte Concentrations for Groundwater Samples (Continued)
Rubble Disposal Area (IRP Site 6)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	IRP6GW-01N 2/23/99

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter



Legend

- ● Direct Push Sample Location
- ■ Groundwater Sample Location
- △ Proposed Borehole Location
- ○ Proposed Well Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.9-2

**Rubble Disposal Site
IRP Site 6
Groundwater Sample Locations
and Analyte
Concentrations (ug/L)**

29179.4.6-9.DWG/PLT

4.9.5 Recommendations for Further Action

As discussed in Section 4.9.3, beryllium, cadmium, chromium, nickel and thallium were detected in groundwater at concentrations that exceeded VAP generic unrestricted potable use standards.

In accordance with OAC 3745-300-07(D)(2), complete pathways must be determined for IRP Site 6. The potentially complete pathway is exposure to groundwater containing chemicals of concern. On-site or off-site receptors may be exposed to groundwater in the following ways:

- Ingestion of chemicals of concern if groundwater is used as a drinking water source.
- Dermal contact with chemicals of concern if groundwater is used for bathing/showering or is contacted incidentally during other potable or process use by receptors.

To determine whether contaminants in soil are leaching to groundwater or are migrating on AFP85 property from other sources, additional soil and groundwater sampling is recommended in the vicinity of the elevated inorganics hits. Two boreholes are recommended within a 20-foot radius of the contaminated sample location (IRP6DP-01) for a total of two boreholes. Boreholes will be drilled to groundwater, samples will be collected every 5 feet, and groundwater will be sampled. Samples will be analyzed for beryllium, cadmium, chromium, nickel and thallium. Proposed sample locations are shown in Figure 4.9-2. In addition, a well should be installed downgradient of the contaminated sample location.

If groundwater sampling analytical results indicate chemicals of concern exceed the unrestricted potable use standards, there are two choices. The first choice is to use institutional or engineering controls to prevent human exposure to chemicals of concern or to remediate groundwater. The second choice is to classify the groundwater. On the basis of groundwater classification, a different set of cleanup requirements will be determined.

The additional groundwater sampling will determine the horizontal extent of contamination. On the basis of this determination, either a baseline risk assessment or further sampling will be conducted.

IRP Site 6 is designated Category 7.

4.10 IRP SITE 7 – PROCESS TANK ACID SPILL SITE

IRP Site 7, the Process Tank Acid Spill Site, located in the chemical milling area of Building 3, was identified during IRP Phase I as the site of a hydrochloric acid solution spill which occurred in September 1990. Approximately 1,600 gallons of hydrochloric acid solution drained from a process tank due to a rupture in a heat exchange pipe. The solution was contained in a diked area equipped with a drain leading to the holding tank at the IWTP. The solution was later neutralized by a lime slurry and discharged to the sanitary sewer.

4.10.1 Site Summary

Soil and groundwater samples were not collected at the site during the IRP Phase I investigation. However, remedial activities have recently taken place in the area. IRP Site 7 occupies the old chemical milling area of Building 3, which consisted of a 5-foot deep pit that held five tanks. The area was used for surface preparation of aluminum. Chemicals used in this operation included Turco 9H, aluminum oxide, sodium sulfide, hydrochloric acid, caustic base, chrome, and cyanide.

Remedial activities were conducted recently in the area. Piping and ductwork, which extended to the ceiling, were located alongside the tanks. Verification of pipe contents was conducted before draining and cutting. The tanks were triple rinsed and cut in place to a manageable size. The scrap steel was staged for resale to a metals broker. Once the tanks were removed, the floor of this area and the walls of the pit were rinsed using a high-pressure/low-volume hydroblaster. The rinsewater was collected and transferred to a holding pool to await characterization and disposal. Sub-floor soil sampling was performed. A total of nine soil samples and one duplicate were taken and analyzed. The samples were analyzed for VOCs, total metals, cyanide, and pH. A report describing these activities and the analytical results was submitted to the OEPA (Reference 192). Comparing the analytical results with the Ohio VAP industrial cleanup standards, OEPA concluded that no further action is required for soil, however, OEPA recommended further evaluation of the concrete surfaces (Reference 197). The integrity of the containment system for the hazardous waste is assumed to be intact based on the results of the subfloor sampling.

4.10.2 Field Activities Conducted

Twenty two concrete chip samples were collected at IRP Site 7 and were analyzed for metals. Sample locations are shown in Figure 4.10-1. The following chart presents the number of samples collected at this site, as well as the analyses performed.

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☐ **Other:**

Number of Samples Collected at IRP Site 7				
Sampling Point	Soil	Groundwater	Soil Gas	Other (1)
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	--	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Concrete	--	--	--	22
Wipe Samples	--	--	--	--

(1) Concrete chip analytical suite: Metals (SW3050/6010).

4.10.3 Results

Numerous inorganics were detected in the concrete chip samples collected at IRP Site 7; analytical results are presented in Table 4.10-1. Aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, silver, vanadium and zinc were detected at concentrations exceeding respective background concentrations in various samples. Background concentrations were determined during the Phase II-Fall 1998 effort. There were no detected concentrations that exceeded the respective VAP soil standard for industrial land uses or the Region IX PRG standard for industrial soil.

4.10.4 Data Validation Summary

Twenty-two concrete chip samples and two concrete chip duplicates were collected at IRP Site 7 and were analyzed for inorganics.

Non-detect results for selenium were qualified R and rejected for twenty-four concrete chip samples due to low percent recovery of matrix spikes and a high RPD between matrix spike and matrix spike duplicate results. More than 59% of the inorganic data points were estimated due to matrix interference and field duplicate precision.

All concrete chip data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at IRP Site 7:

Table 4.10-1

Summary of Analyte Concentrations for Concrete Chip Samples
Process Tank Acid Spill Site (IRP Site 7)

Sample ID Date Sampled	VAP Industrial Single Chemical Generic Direct-Contact Soil Standard	Building 3 Maximum Background Concentration for Concrete Chip Samples	IRP7CP-01N 2/18/99	IRP7CP-02N 2/18/99	IRP7CP-03N 2/18/99	IRP7CP-04N 2/18/99	IRP7CP-05N 2/18/99	IRP7CP-06N 2/18/99
Analyte	**Inorganics by SW6010 (mg/kg)**							
Aluminum	1000000	6500	8200	8000	9400	7100	8900	7200
Antimony	220	10 UJ	1 U	1 U	8 2	3 8	1 U	2 9
Arsenic	86	9 3	5 5	5 6	7 7	13	5 6	5 5
Barium	140000	94 J	87	860	470	120	81	120
Cadmium	300	0 5 UJ	1.3	1.5	4	1.1	0.55	0.54
Chromium (Total)	2800	12 J	24	80	610	100	28	69
Cobalt	10000	4 1 J	8.3	30	4.2	17	13	7.7
Copper	70000 *	18 J	75	110	290	74	430	38
Iron	100000 *	8400	12000	12000	39000	16000	14000	10000
Lead	2800	5 UJ	36	82	260	58	37	47
Manganese	45000 *	250	330	220	340	270	400	290
Nickel	3700	13 J	21	17	29	16	24	11
Silver	10000	2 U	2 U	93	2 U	62	2 U	15
Vanadium	14000	15 J	16	14	17	14	15	12
Zinc	370000	22 J	110	720	2200	350	140	270

Table 4.10-1

Summary of Analyte Concentrations for Concrete Chip Samples
Process Tank Acid Spill Site (IRP Site 7)

Sample ID Date Sampled	VAP Industrial Single Chemical Generic Direct-Contact Soil Standard	Building 3 Maximum Background Concentration for Concrete Chip Samples	IRP7CP-07N 2/18/99	IRP7CP-07D 2/18/99	IRP7CP-08N 2/18/99	IRP7CP-09N 2/18/99	IRP7CP-10N 2/18/99	IRP7CP-11N 2/18/99
Analyte	**Inorganics by SW6010 (mg/kg)**							
Aluminum	1000000	6500	6600	6600	6800	7100	7500	6500
Antimony	220	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Arsenic	86	9 3	5 4	5 4	7	5 2	6 6	6
Barium	140000	94 J	83	83	79	110	63	140
Cadmium	300	0 5 UJ	0 5 U	0 5 U	0 5 U	0.69	0 5 U	0 5 U
Chromium (Total)	2800	12 J	33	35	110	47	13	14
Cobalt	10000	4 1 J	5.9	6.2	8.2	6.2	5.5	7.1
Copper	70000 *	18 J	130	100	35	160	20	150
Iron	100000 *	8400	11000	13000	12000	11000	10000	11000
Lead	2800	5 UJ	37	37	49	30	13	9
Manganese	45000 *	250	210	310	310	250	240	280
Nickel	3700	13 J	12	13	14	14	11	14
Silver	10000	2 U	2 U	2 U	25	2 U	13	2 U
Vanadium	14000	15 J	12	13	14	12	14	13
Zinc	370000	22 J	75	100	63	160	42	51

Table 4.10-1

Summary of Analyte Concentrations for Concrete Chip Samples
Process Tank Acid Spill Site (IRP Site 7)

Sample ID Date Sampled	VAP Industrial Single Chemical Generic Direct-Contact Soil Standard	Building 3 Maximum Background Concentration for Concrete Chip Samples	IRP7CP-12N 2/18/99	IRP7CP-13N 2/18/99	IRP7CP-14N 2/18/99	IRP7CP-15N 2/18/99	IRP7CP-16N 2/18/99	IRP7CP-16D 2/18/99
Analyte	**Inorganics by SW6010 (mg/kg)**							
Aluminum	1000000	6500	6500	6800	7100	7400	6500	6100
Antimony	220	10 UJ	1 U	1 U	1 U	5 6	1 U	1 U
Arsenic	86	9 3	6 6	8 2	7 5	6 7	6 6	5 4
Barium	140000	94 J	300	120	69	68	96	79
Cadmium	300	0 5 UJ	0 5 U	0.59	0.57	0 5 U	0.64	0 5 U
Chromium (Total)	2800	12 J	13	67	110	29	26	10
Cobalt	10000	4 1 J	4 1	4.6	5.5	4.4	4 1	3 8
Copper	70000 *	18 J	19	88	37	43	42	14
Iron	100000 *	8400	9300	11000	11000	10000	11000	8100
Lead	2800	5 UJ	9.5	29	8.6	14	38	14
Manganese	45000 *	250	310	230	260	300	260	220
Nickel	3700	13 J	8 2	11	11	9 6	9 3	7 9
Silver	10000	2 U	4.1	2 U	5.3	2 U	6.1	5.3
Vanadium	14000	15 J	13	12	14	13	11	10
Zinc	370000	22 J	76	150	51	55	160	32

Table 4.10-1

Summary of Analyte Concentrations for Concrete Chip Samples
Process Tank Acid Spill Site (IRP Site 7)

Sample ID Date Sampled	VAP Industrial Single Chemical Generic Direct-Contact Soil Standard	Building 3 Maximum Background Concentration for Concrete Chip Samples	IRP7CP-17N 2/18/99	IRP7CP-18N 2/18/99	IRP7CP-19N 2/18/99	IRP7CP-20N 2/18/99	IRP7CP-21N 2/18/99	IRP7CP-22N 2/18/99
Analyte	**Inorganics by SW6010 (mg/kg)**							
Aluminum	1000000	6500	6400	6900	6100	6200	6100	5900
Antimony	220	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Arsenic	86	9 3	6 6	5 3	6	5 1	5 5	5 6
Barium	140000	94 J	67	120	72	79	90	84
Cadmium	300	0 5 UJ	0 5 U	0 5 U	0 5 U	0 5 U	0 5 U	0 5 U
Chromium (Total)	2800	12 J	29	21	17	43	28	14
Cobalt	10000	4 1 J	3 9	3 8	4	3 7	3 8	3 7
Copper	70000 *	18 J	24	22	18	18	16	20
Iron	100000 *	8400	8900	9300	11000	8600	8300	7900
Lead	2800	5 UJ	9 1	14	7.7	10	12	8.3
Manganese	45000 *	250	220	260	250	250	200	200
Nickel	3700	13 J	8	8 6	9	8 5	8 8	7 5
Silver	10000	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vanadium	14000	15 J	11	12	14	13	12	12
Zinc	370000	22 J	44	88	36	40	29	27

Table 4.10-1

Summary of Analyte Concentrations for Concrete Chip Samples (Continued)
Process Tank Acid Spill Site (IRP Site 7)

Sample ID Date Sampled Depth	VAP Industrial Single Chemical Generic Direct-Contact Soil	Building 3 Maximum Background Concentration for Concrete Chip Samples	IRP7CP-17N 2/18/99	IRP7CP-18N 2/18/99	IRP7CP-19N 2/18/99	IRP7CP-20N 2/18/99	IRP7CP-21N 2/18/99	IRP7CP-22N 2/18/99

Note: Shaded cells indicate that the chemical was quantified at a concentration that either exceeds the Ohio VAP Single Chemical Generic Direct-Contact Soil Standard or exceeds background for Building 3 concrete
Sample IDs IRP7CP-07D and IRP7CP-16D are field duplicates

Key:

*	=	Industrial soil standard for Region IX Preliminary Remedial Goals (PRGs)
B	=	Present in associated method blank
J	=	Estimated
mg/kg	=	Milligrams per kilogram
NA	=	Not available
ND	=	Not detected in background sample(s)
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram
UJ	=	Indicates that the compound was analyzed for but not detected The sample detection limit is an estimation

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Concrete Chip					
Inorganics	528	24	95.5%	59.7%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.10.5 Recommendations for Further Action

The concrete floor appears to be intact and shows no signs of cracks or physical weaknesses where leaching could occur. Furthermore the undisturbed condition of the concrete would eliminate the potential for any residual compounds in the surface to become accessible to human uptake via dermal or ingestion pathways. Based on field observation, analytical results and previous sub-floor soil sample results which demonstrated no elevated concentrations, no further action is recommended. IRP Site 7 is recommended for Category 4 designation.

4.11 JET ENGINE TEST CELL (270)

Building 270 is a jet engine test cell, located in the northern portion of the main industrial parcel.

4.11.1 Site Summary

Documents reviewed did not reveal any information about the possible nature or extent of environmental contamination that may have resulted from past operations. This site was conservatively designated Category 7 in the EBS (Reference 213) because engine testing typically involves hazardous substances and petroleum products.

4.11.2 Field Activities Conducted

Six boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Nine direct push soil samples and four groundwater samples were collected at 270 Jet Engine Test Cell and were analyzed for VOCs, SVOCs, TPH, GRO and DRO. Free product was encountered within the first five feet of 270DP-01. A sample for vertical conductivity determination was collected. Sample locations are shown in Figure 4.11-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

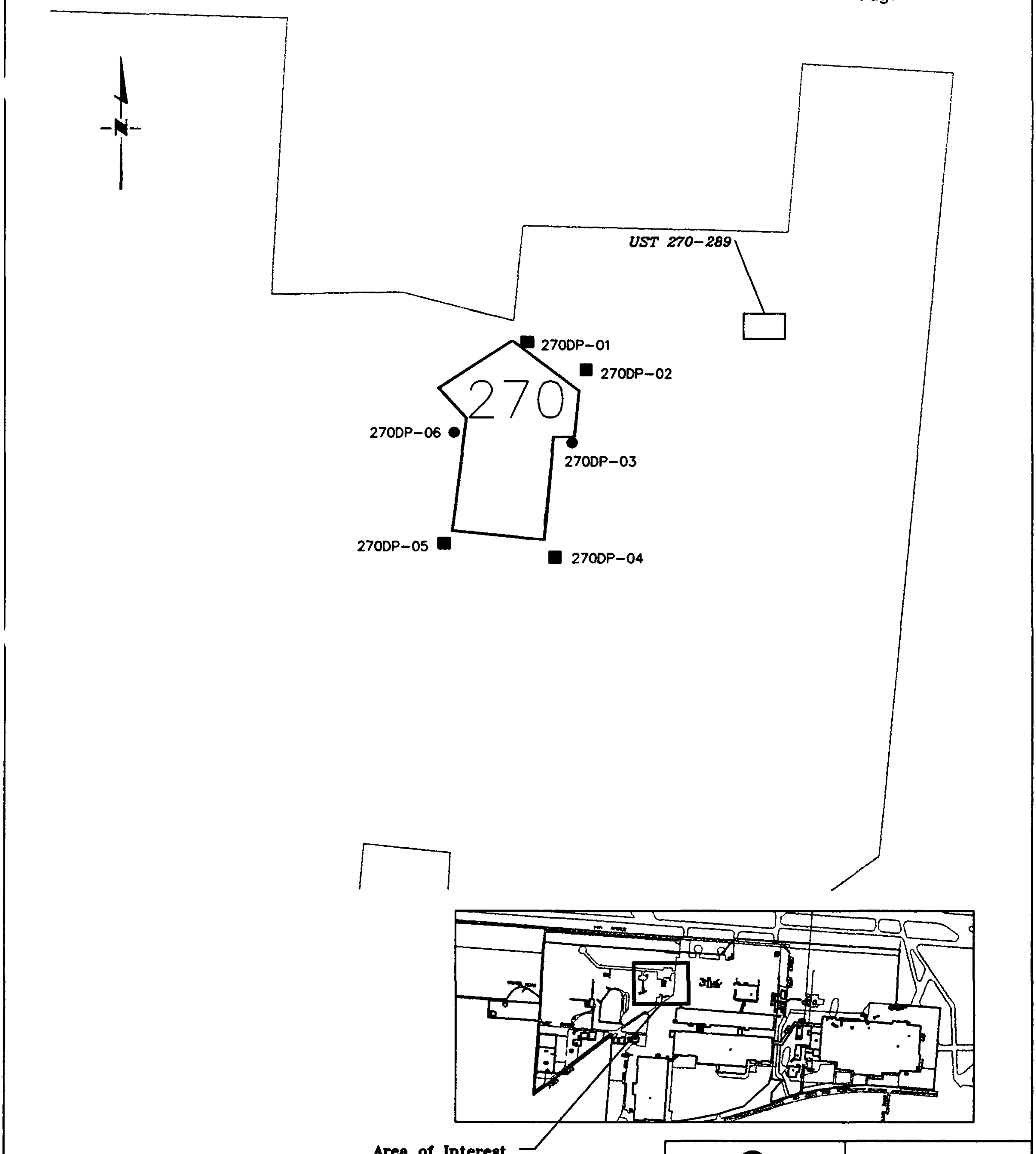
Number of Samples Collected at Jet Engine Test Cell				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	9	4	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Volatile organic compounds (SW8260), Diesel range and gasoline range organics (modified SW8015), vertical conductivity, soil moisture (ASTM D2216), and SVOCs (SW3550/SW8270).

(2) Groundwater analytical suite: Volatile organic compounds (SW8260), Diesel range and gasoline range organics (modified SW8015), and SVOCs (SW3510/SW8270).

4.11.3 Results

Numerous VOCs, SVOCs and TPH were detected in soil samples collected at 270; concentrations are presented in Table 4.11-1. Table 4.11-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Six boreholes were advanced at Jet Engine Test Cell 270; depths ranged from 8 to 12 feet bgs. The soils encountered varied from yellow brown silty clay, with trace sand and little gravel. Groundwater was encountered between 6 and 10 feet bgs. A vertical conductivity value of 8.9×10^{-8} cm/s was reported for sample 270VP-06 collected at 3 to 4 feet bgs.



EARTH TECH

Figure 4.11-1

Jet Engine Test Cell (270) Soil and Groundwater Sample Locations

Legend
- ● Direct Push Sample Location
- ■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

29178.4.11-15.DWG/.PLT

Table 4.11-1

Summary of Analyte Concentrations for Soil Samples
Jet Engine Test Cell (270)

Sample ID / Date Sampled / Depth	270DP-0101N 2/18/99 0 - 4 ft bgs	270DP-0101D 2/18/99 0 - 4 ft bgs	270DP-0201N 2/18/99 4 - 8 ft bgs	270DP-0202N 2/18/99 8 - 12 ft bgs	270DP-0301N 2/19/99 4 - 8 ft bgs	270DP-0302N 2/19/99 8 - 10 ft bgs
Analyte	**Volatiles by SW8260 (ug/kg)**					
1,2,4-Trimethylbenzene	100 J	240 J	450 U	390 U	470 U	480 U
1,2-Dichloroethane	660 U	520 U	450 U	390 U	25 J	480 U
Acetone	800 J	550 J	530 J	480 J	430 J	500 J
Bromomethane	1300 U	1000 U	910 U	790 U	77 J	950 U
Chlorobenzene	660 U	520 U	450 U	390 U	470 U	480 U
Chloromethane	1300 U	1000 U	910 U	790 U	23 J	950 U
Hexachlorobutadiene	660 U	520 U	450 U	390 U	28 J	480 U
Isopropylbenzene	57 J	29 J	450 U	390 U	470 U	480 U
m-Xylene	52 J	21 J	450 U	390 U	470 U	480 U
Methyl Ethyl Ketone	920 J	730 J	620 J	530 J	640 J	600 J
Methylene Chloride	660 U	520 U	48 J	15 J	24 J	19 J
n-Butylbenzene	470 J	320 J	450 U	390 U	470 U	480 U
n-Hexane	51 J	31 J	910 U	790 U	940 U	950 U
Naphthalene	1300 U	1000 U	910 U	790 U	940 U	950 U
p-Cymene	140 J	160 J	450 U	390 U	470 U	480 U
sec-Butylbenzene	280 J	160 J	450 U	390 U	470 U	480 U
t-Butylbenzene	660 U	520 U	450 U	390 U	470 U	480 U
Toluene	42 J	25 J	450 U	390 U	470 U	480 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
Anthracene	210 U	200 U	190 U	190 U	190 U	200 U
Benzo(a)anthracene	210 U	200 U	190 U	190 U	190 U	200 U
Benzo(a)pyrene	210 U	200 U	190 U	190 U	190 U	200 U

Table 4.11-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Jet Engine Test Cell (270)

Sample ID Date Sampled Depth	270DP-0101N 2/18/99 0 - 4 ft bgs	270DP-0101D 2/18/99 0 - 4 ft bgs	270DP-0201N 2/18/99 4 - 8 ft bgs	270DP-0202N 2/18/99 8 - 12 ft bgs	270DP-0301N 2/19/99 4 - 8 ft bgs	270DP-0302N 2/19/99 8 - 10 ft bgs
Benzo(b)fluoranthene	210 U	200 U	190 U	190 U	190 U	200 U
Benzo(k)fluoranthene	210 U	200 U	190 U	190 U	190 U	200 U
bis(2-Ethylhexyl)phthalate	210 U	200 U	190 U	74 J	190 U	200 U
Chrysene	210 U	200 U	190 U	190 U	190 U	200 U
Fluoranthene	210 U	200 U	190 U	190 U	190 U	200 U
Fluorene	210 U	200 U	190 U	190 U	190 U	200 U
Hexachlorobutadiene	210 U	200 U	190 U	190 U	190 U	200 U
Indeno(1,2,3-c,d)pyrene	210 U	200 U	190 U	190 U	190 U	200 U
Naphthalene	210 U	200 U	190 U	190 U	190 U	200 U
Phenanthrene	210 U	200 U	190 U	190 U	190 U	200 U
Pyrene	210 U	200 U	190 U	190 U	190 U	200 U
Analyte	**TPH by M8015D (ug/kg)**					
PHC as Gasoline	4900	3200	110 U	110 U	120 U	120 U
PHC C16-C32	32000	270000	16000	21000	13000	9100 J

Table 4.11-1

Summary of Analyte Concentrations for Soil Samples
Jet Engine Test Cell (270)

Sample ID Date Sampled Depth	270DP-0401N 2/18/99 0 - 4 ft bgs	270DP-0401D 2/18/99 0 - 4 ft bgs	270DP-0402N 2/18/99 4 - 8 ft bgs	270DP-0501N 2/19/99 4 - 8 ft bgs	270DP-0601N 2/19/99 4 - 8 ft bgs	270DP-0601D 2/19/99 4 - 8 ft bgs
Analyte	**Volatiles by SW8260 (ug/kg)**					
1,2,4-Trimethylbenzene	620 U	520 U	480 U	540 U	420 U	450 U
1,2-Dichloroethane	620 U	520 U	480 U	540 U	420 U	450 U
Acetone	600 J	570 J	510 J	11000 U	410 J	400 J
Bromomethane	1200 U	1000 U	960 U	1100 U	840 U	910 U
Chlorobenzene	620 U	520 U	480 U	540 U	420 U	450 U
Chloromethane	1200 U	1000 U	960 U	1100 U	840 U	910 U
Hexachlorobutadiene	620 U	520 U	480 U	540 U	420 U	450 U
Isopropylbenzene	620 U	520 U	480 U	540 U	420 U	450 U
m-Xylene	620 U	520 U	480 U	540 U	420 U	450 U
Methyl Ethyl Ketone	750 J	670 J	690 J	730 J	580 J	620 J
Methylene Chloride	620 U	520 U	41 J	35 J	28 J	450 U
n-Butylbenzene	620 U	520 U	480 U	540 U	34 J	450 U
n-Hexane	1200 U	1000 U	960 U	1100 U	840 U	910 U
Naphthalene	1200 U	1000 U	960 U	1100 U	45 J	910 U
p-Cymene	620 U	520 U	480 U	540 U	30 J	450 U
sec-Butylbenzene	620 U	520 U	480 U	540 U	30 J	450 U
t-Butylbenzene	620 U	520 U	480 U	540 U	21 J	450 U
Toluene	25 J	520 U	480 U	540 U	420 U	450 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
Anthracene	200 U	200 U	55 J	200 U	190 U	190 U
Benzo(a)anthracene	200 U	200 U	130 J	200 U	190 U	190 U
Benzo(a)pyrene	200 U	200 U	120 J	200 U	190 U	190 U
Benzo(b)fluoranthene	200 U	200 U	110 J	200 U	190 U	190 U

Table 4.11-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Jet Engine Test Cell (270)

Sample ID Date Sampled Depth	270DP-0401N 2/18/99 0 - 4 ft bgs	270DP-0401D 2/18/99 0 - 4 ft bgs	270DP-0402N 2/18/99 4 - 8 ft bgs	270DP-0501N 2/19/99 4 - 8 ft bgs	270DP-0601N 2/19/99 4 - 8 ft bgs	270DP-0601D 2/19/99 4 - 8 ft bgs
Benzo(k)fluoranthene	200 U	200 U	91 J	200 U	190 U	190 U
bis(2-Ethylhexyl)phthalate	200 U	200 U	200 U	200 U	190 U	190 U
Chrysene	200 U	200 U	180 J	200 U	190 U	190 U
Fluoranthene	200 U	200 U	340	200 U	190 U	190 U
Fluorene	200 U	200 U	49 J	200 U	190 U	190 U
Hexachlorobutadiene	200 U	200 U	200 U	200 U	190 U	190 U
Indeno(1,2,3-c,d)pyrene	200 U	200 U	69 J	200 U	190 U	190 U
Naphthalene	200 U	200 U	200 U	200 U	190 U	190 U
Phenanthrene	200 U	200 U	300	200 U	190 U	190 U
Pyrene	200 U	200 U	280	200 U	190 U	190 U
Analyte	**TPH by M8015D (ug/kg)**					
PHC as Gasoline	120 U	120 U	120 U	120 U	110 U	110 U
PHC C16-C32	24000	8000 J	9100 J	8100 J	7300 J	9000 J

Note: Sample IDs 270DP-0101D, 270DP-0401D and 270DP-0601D are field duplicates

Key:

B = Present in associated method blank
bgs = Below ground surface
D = The analyte was quantified at a secondary dilution factor
J = Estimated
mg/kg = Milligrams per kilogram
S = Analyzed by method of standard addition
U = Not detected
ug/kg = Micrograms per kilogram

Table 4.11-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Jet Engine Test Cell (270)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Volatiles by SW8260		
Acetone	55000 00	0 8
Bromomethane	NA	0 077
n-Butylbenzene	250	0 47
sec-Butylbenzene	NA	0 28
t-Butylbenzene	NA	0 021
Toluene	520 00	0 042
n-Hexane	200 00	0 051
Chloromethane	2 6	0 023
p-Cymene	NA	0 16
1,2-Dichloroethane	41 00	0 025
Hexachlorobutadiene	38	0 028
Isopropylbenzene	NA	0 057
Methyl Ethyl Ketone	27000 00	0 92
Methylene Chloride	990.00	0 048
Naphthalene	22000 00	0 045
1,2,4-Trimethylbenzene	260	0 24
m-Xylene	NA	0 052
Semivolatiles by SW8270		
Anthracene	91000 00	0 055
bis(2-Ethylhexyl)phthalate	860 00	0 074

Table 4.11-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Jet Engine Test Cell (270)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Benzo(a)anthracene	31 00	0 13
Benzo(a)pyrene	3 10	0 12
Benzo(b)fluoranthene	31 00	0 11
Benzo(k)fluoranthene	310 00	0 091
Chrysene	3100 00	0 18
Fluorene	12000 00	0 049
Fluoranthene	12000 00	0 34
Indeno(1,2,3-c,d)pyrene	31 00	0 069
Phenanthrene	91000 00	0 3
Pyrene	9100 00	0 28
TPH by M8015D		
PHC C16-C32	40000	270
PHC as Gasoline	8000	4.9

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable. A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Numerous VOCs, SVOCs, and TPH were detected in the groundwater at 270; concentrations are presented in Table 4.11-3. There were no detected concentrations that exceeded the respective VAP standard.

4.11.4 Data Validation Summary

Nine soil samples, three soil duplicate and four groundwater samples were collected at 270 and were analyzed for VOCs, SVOCs and TPH (GRO and DRO).

On the basis of concentrations detected in associated blanks, p-isopropyltoluene results were qualified as non-detect for two soil samples (270DP-0101N and 270DP-0101D). As a result of blank contamination, methylene chloride results were qualified as non-detect in five soil samples and three groundwater samples. Hexachlorobutadiene was qualified non-detect in the soil sample 270DP-0301N. Acetone and toluene were detected in associated blanks and so results in one groundwater sample (270GW-04N) were qualified as non-detect.

Non-detect results for 3,3'-dichlorobenzidine were qualified R and rejected for ten soil samples due to low percent recovery of laboratory control samples.

More than 62% of the TPH (GRO and DRO) data points for soil samples were estimated due to low percent recovery of matrix and surrogate spikes.

All groundwater data points are useable. All soil data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at 270:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	816	0	100%	6.5%	1.0%
SVOCs	792	10	98.7%	4.0%	0%
TPH (GRO and DRO)	24	0	100%	62.5%	0%
Groundwater					
VOCs	272	0	100%	10.0%	1.5%
SVOCs	264	0	100%	3.0%	0%
TPH (GRO and DRO)	8	0	100%	12.5%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.11.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. Jet Engine Test Cell (270) is recommended for Category 4 designation.

Table 4.11-3

Summary of Analyte Concentrations for Groundwater Samples
Jet Engine Test Cell (270)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	270GW-01N 2/18/99	270GW-02N 2/18/99	270GW-04N 2/18/99	270GW-05N 2/19/99
Analyte	**Volatiles by SW8260 (ug/L)**				
1,1,1-Trichloroethane	200	5 U	5 U	0 84 J	5 U
1,2,4-Trimethylbenzene	NA	43	5 U	5 U	5 U
1,2-Dichlorobenzene	NA	5 U	5 U	0 33 J	5 U
1,2-Dichloroethane	5	0 36 J	5 U	5 U	5 U
1,3,5-Trimethylbenzene	NA	7 6	5 U	5 U	5 U
2-Hexanone	NA	2 9 J	10 U	10 U	10 U
Acetone	NA	40 J	7 6 J	5 4 J	100 U
Benzene	5	5 U	5 U	0 98 J	5 U
Carbon Disulfide	880	5 U	5 U	0 85 J	5 U
Carbon Tetrachloride	5	5 U	5 U	0 62 J	5 U
Chlorobenzene	NA	5 U	5 U	0 76 J	5 U
Ethylbenzene	700	1 1 J	5 U	0 94 J	5 U
Isopropylbenzene	NA	2 6 J	5 U	5 U	5 U
m-Xylene	NA	5 U	5 U	1 8	5 U
Methyl Ethyl Ketone	8600	27 J	3 9 J	5 1 J	2 6 J
Methyl Isobutyl Ketone	NA	2 8 J	10 U	10 U	10 U
n-Butylbenzene	NA	9 8	5 U	5 U	5 U
n-Propylbenzene	NA	3 3 J	5 U	5 U	5 U
Naphthalene	NA	11	10 U	10 U	10 U
o-Xylene	NA	5 U	5 U	0 76 J	5 U
p-Cymene	NA	8 4	5 U	5 U	5 U

Table 4.11-3

Summary of Analyte Concentrations for Groundwater Samples (Continued)
Jet Engine Test Cell (270)

Sample ID / Date Sampled	VAP Generic Unrestricted Potable Use Standard	270GW-01N 2/18/99	270GW-02N 2/18/99	270GW-04N 2/18/99	270GW-05N 2/19/99
sec-Butylbenzene	NA	4 5 J	5 U	5 U	5 U
Tetrachloroethene	5	5 U	5 U	0 88 J	5 U
Toluene	1000	5 U	5 U	1 J	0 25 J
Trichloroethene	5	5 U	5 U	0 98 J	5 U
Analyte	**Semivolatiles by SW8270 (ug/L)**				
1,2-Dichlorobenzene	NA	11 U	10 U	12 U	10 U
2-Methylnaphthalene	NA	5 7 J	10 U	12 U	10 U
bis(2-Ethylhexyl)phthalate	NA	13	6 8 J	5 J	10 U
Diethylphthalate	NA	11 U	10 U	1 2 J	10 U
Naphthalene	NA	11 U	10 U	12 U	10 U
Analyte	**TPH by M8015 (ug/L)**				
PHC as Gasoline	NA	13000	100 U	100 U	100 U
PHC C16-C32	NA	4700	600 U	480 J	550 U

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter

4.12 METAL CHIP BAILER PIT (125-BAILER)

This FACNO is associated with a former concrete pit located between columns C-7 and C-9 at the center section of Building 125. The pit measured approximately 25 feet by 20 feet by 3 feet deep. The pit collected waste coolant oils from a chip bailer that were gravity fed to an oil pit (125-SUMP) and then to UST 125-166. It was operated from 1954 until 1994.

4.12.1 Site Summary

The pit and adjacent utility trenches were cleaned with water in 1996. Upon completion of cleaning activities, 5 confirmatory PCB (Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260) wipe samples were collected—4 from pit concrete surfaces and 1 from the utility trenches. All analyses were nondetect except one sample that was 2.0 μg/100 cm^2 for Aroclor-1260 (Reference 191). Because the quantified results did not exceed the 10 μg/100 cm^2 minimum clean-up level issued by Toxic Substance Control Act (TSCA), no further sampling or remedial activities associated with PCBs was warranted at this location.

4.12.2 Field Activities Conducted

Three boreholes were advanced along the west side of Building 125. Since the rig could not access the proposed sample locations at the bailer; these locations were chosen since they are hydrologically downgradient of the site. Each borehole was continuously sampled every five feet until groundwater or refusal. Five direct push soil samples were collected at 125 BAILER and analyzed for metals, GRO and DRO. Groundwater was reached but no samples were collected. Two hand auger samples were collected inside Building 125 where the direct push rig could not access. Sample locations are shown in Figure 4.12-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at 125-BAILER				
Sampling Point	Soil(1)	Groundwater	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	3	--	--	--
Hand Auger to 6-inch	2	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	--
Wipe Samples	--	--	--	--

(1) Soil analytical suite: metals (SW3050/6010), diesel range organics, gasoline range organics (modified SW8015), and soil moisture (ASTM D2216).

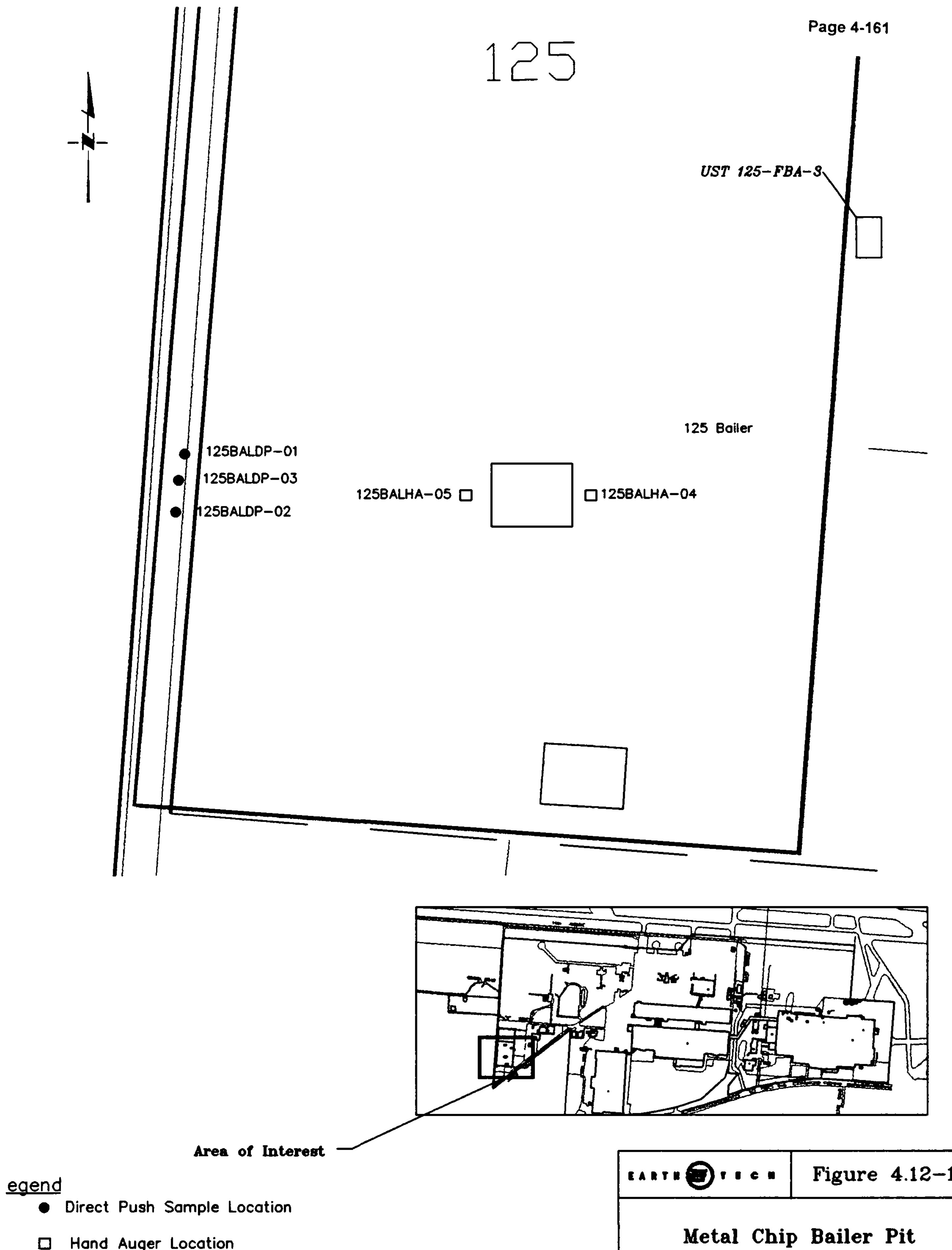


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Figure 4.12-1

Metal Chip Bailer Pit (125-BAILER) Soil Sample Locations

29179.4.11-15.DWG/.PLT

4.12.3 Results

Mercury, TPH, and numerous inorganics were detected in soil samples collected at 125-BAILER; concentrations are presented in Table 4.12-1. Table 4.12-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Three boreholes were advanced at 125-BAILER; depths ranged from 8 to 12 feet bgs. The soils encountered varied from yellow brown silty clay to clay, with trace sand and trace gravel. Groundwater was encountered between 4 and 7 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 1.35×10^{-7} cm/s was reported at nearby 125-BAILER and a value of 5.35×10^{-8} cm/s was reported at 125-FBA-3.

4.12.4 Data Validation Summary

Seven soil samples and one soil duplicate were collected at 125-BAILER and were analyzed for TPH (GRO and DRO) and inorganics.

On the basis of concentrations detected in associated laboratory blanks, sodium results were qualified as non-detect for two soil samples (125BALHA-04N and 125BALHA-05N). Antimony, calcium and lead non-detect results were qualified R and rejected for the same two soil samples due to low percent recovery of matrix spikes and a high RPD between matrix spike and matrix spike duplicate results. More than 45% of the inorganic data points were estimated due to matrix interference and field duplicate precision.

All soil data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at 125-BAILER:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
TPH (GRO and DRO)	16	0	100%	0%	0%
Inorganics	184	2	98.9%	45.7%	1.1%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.12.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. The Metal Chip Bailer Pit (125-BAILER) is recommended for Category 4 designation.

Table 4.12-1

Summary of Analyte Concentrations for Soil Samples
Metal Chip Bailer Pit (125-BAILER)

Sample ID / Date Sampled / Depth	125BALDP-0101N 2/11/99 0 - 4 ft bgs	125BALDP-0101D 2/11/99 0 - 4 ft bgs	125BALDP-0102N 2/11/99 4 - 8 ft bgs	125BALDP-0201N 2/11/99 0 - 4 ft bgs	125BALDP-0301N 2/11/99 4 - 8 ft bgs	125BALDP-0302N 2/11/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	10100	17400	15800	9980	11000	12600
Arsenic	14	11 9	22 3	14 6	23 4	22 2 D
Barium	169	136	175	118	102	146 D
Beryllium	0 43 J	0 72	0 66	0 52 J	0 51 J	0 56 J
Cadmium	0 59 U	0 64 U	0 63 U	0.59 U	0 61 U	0 62 U
Chromium (Total)	13 5	20 9	22 1	13	15 2	17 5 D
Cobalt	9 7	9 6	14 5	13 6	11 1	11 D
Copper	26 3	23	32 3	14 4	33	31
Iron	23100	26400	31700	23000	35000	31700 D
Lead	14 4	16 3	21 8	20 4	14 4	14 6 D
Manganese	340	456	576	1180	293	500 D
Nickel	29 9	27	41 1	16 3	38	37 5 D
Thallium	1 J	1 3 U	1 3 U	1 2 U	1 2 U	1 2 U
Vanadium	29 7	39 9	47 4	31 9	28 5	32 7 D
Zinc	98 7 B	91 3 B	112 B	61 9 B	106 B	102 D
Analyte	**Mercury by SW7471 (mg/kg)**					
Mercury	0 05 J	0 11 J	0 067 J	0 051 J	0 06 J	0 064 J
Analyte	**TPH by M8015D (mg/kg)**					
PHC C10-C22	25	34	21	12 U	12 U	62 U

Table 4.12-1

Summary of Analyte Concentrations for Soil Samples
Metal Chip Bailer Pit (125-BAILER)

Sample ID / Date Sampled / Depth	125BALHA-04N 2/17/99 0 - 0 ft bgs	125BALHA-05N 2/17/99 0 - 0 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**	
Aluminum	8800	5540
Arsenic	19 4 D	24 4
Barium	67 6 D	100
Beryllium	0 38 J	0 33 J
Cadmium	1 3	1 3
Chromium (Total)	13 1 D	9 2
Cobalt	8 3 D	7 5
Copper	30 2	28 9
Iron	20600 D	24000
Lead	15 9 D	16 4
Manganese	473 D	513
Nickel	35 8 D	33 1
Thallium	1 1	1 1 J
Vanadium	57 D	42 9
Zinc	135 D	141
Analyte	**Mercury by SW7471 (mg/kg)**	
Mercury	0 052 J	0 09 J
Analyte	**TPH by M8015D (mg/kg)**	
PHC C10-C22	20	41

Table 4.12-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Metal Chip Bailer Pit (125-BAILER)

Sample ID Date Sampled Depth	125BALHA-04N 2/17/99 0 - 0 ft bgs	125BALHA-05N 2/17/99 0 - 0 ft bgs

Note: Sample ID 125BALDP-0101D is a field duplicate

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.12-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Metal Chip Bailer Sump (125-BAILER)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	17400
Arsenic	86 00	24 4
Barium	140000 00	175
Beryllium	30	0 72
Calcium	NA	81000
Cadmium	300 00	1 3
Cobalt	10000	14 5
Chromium (Total)	2800 00	22 1
Copper	70000	33
Iron	100000	35000
Potassium	NA	2430
Magnesium	NA	25100
Manganese	45000	1180
Sodium	NA	208
Nickel	3700 00	41.1
Lead	2800	21 8
Thallium	160	1 1
Vanadium	14000	57
Zinc	370000 00	141
Mercury by SW7471		

Table 4.12-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Metal Chip Bailer Sump (125-BAILER)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Mercury	230 00	0 11
TPH by M8015D		
PHC C10-C22	20000	41

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

4.13 METAL CHIP BAILER SUMP (125-SUMP)

This sump collected waste coolant from the metal chip bailer (125-BAILER) in Building 125 and wastewaters from the truck dock catch basin and the scale pit floor drain. The contents were assumed to be separated, with the waters pumped to a stormwater trench drain located south of the building and the waste oils pumped to an UST (125-166) located south of the building (Reference 254).

4.13.1 Site Summary

During a site visit (Reference 160), the presence of oils in the sump area was noted. There have been no investigations of this area to date. Because the unit is associated with the metal chip bailer, sampling of the sump contents was recommended in the EBS (Reference 213).

4.13.2 Field Activities Conducted

Five boreholes were advanced at this location. Six boreholes were planned; however, refusal was met at one borehole prior to initial sample collection. Each borehole was continuously sampled every five feet until groundwater or refusal. Twelve direct push soil samples and one groundwater sample were collected at 125-SUMP and analyzed for VOCs, SVOCs, PCBs, metals, GRO and DRO. A sample for vertical conductivity determination was collected. Also, one liquid grab sample was collected and analyzed for SVOCs, PCBs, GRO and DRO. Sample locations are shown in Figure 4.13-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at 125-SUMP				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other(3)
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	12	1	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	1
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Metals (SW3050/6010), Volatile organic compounds (SW8260), diesel range organics gasoline range organics (modified SW8015), PCBs (SW3550/8080 for PCBs only), vertical conductivity, soil moisture (ASTM D2216), and SVOCs (SW3550/8270).

(2) Groundwater analytical suite: Metals (filtered and unfiltered) (SW3005/6010), volatile organic compounds (SW8260), Diesel range and gasoline range organics (modified SW8015), gasoline range organics (modified SW8015), and PCBs (SW8080), SVOCs (SW3510/8270).

(3) Sump contents analytical suite: PCBs (SW8080), and SVOCs (SW3510/8270), Diesel range and gasoline range organics (modified SW8015).

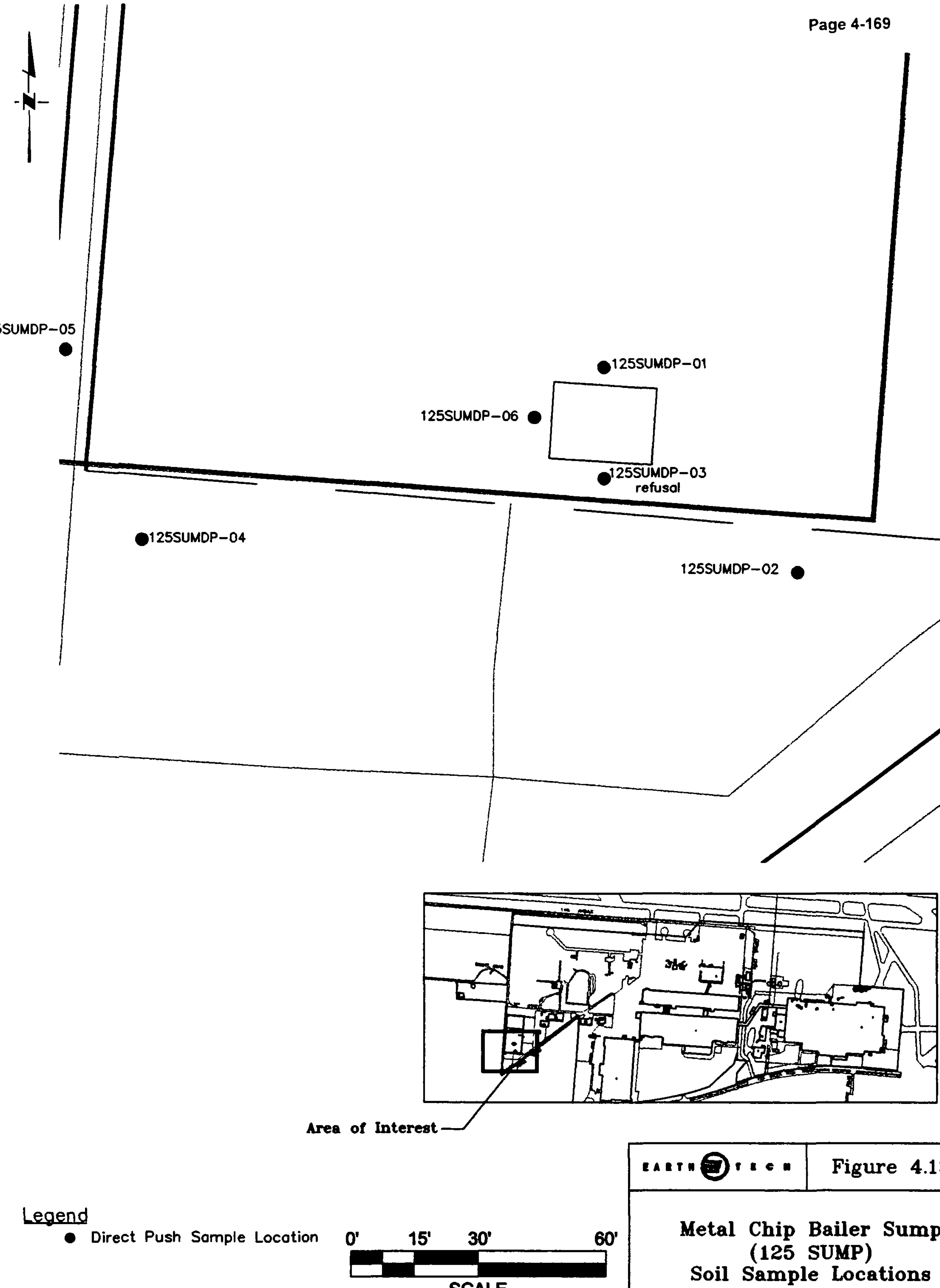

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Figure 4.13-1

Metal Chip Bailer Sump (125 SUMP) Soil Sample Locations

29179 4.11-15.DWG/.PLT

4.13.3 Results

Mercury, PCBs, TPH, numerous inorganics, VOCs, and SVOCs were detected in soil samples collected at 125-SUMP; concentrations are presented in Table 4.13-1. Table 4.13-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Five boreholes were advanced at 125-SUMP; depths ranged from 10 to 20 feet bgs. The soils encountered varied from gray brown silty clay to clayey silt, with gravel and trace sand. Groundwater was encountered between 8 and 12 feet bgs. A vertical conductivity value of 1.35x10-7 cm/s was reported for the sample 125SUM-05 collected at 10-12 feet bgs.

Mercury, TPH and numerous inorganics and VOCs were detected in the groundwater sample collected at 125-SUMP; concentrations are presented in Table 4.13-3. There were no detected concentrations that exceeded the respective VAP standard. Figure 4.13-2 shows the location where samples were collected.

SVOCs and TPH were detected in the liquid grab sample collected at 125-SUMP; concentrations are presented in Table 4.13-4. Figure 4.13-2 shows the location of the elevated concentrations.

4.13.4 Data Validation Summary

Twelve soil samples, two soil duplicates, one groundwater sample and one grab sample were collected at 125-SUMP and were analyzed for VOCs, SVOCs, PCBs, TPH (GRO and DRO) and inorganics.

Methylene chloride results were qualified as non-detect for one groundwater sample as a result of field blank contamination. All VOC detects were qualified J for sample 125SUMGW-02N due to a VOC holding time exceedance.

On the basis of concentrations detected in associated laboratory blanks, sodium results were qualified as non-detect for seven soil samples and one groundwater sample. More than 84% of the inorganic data points were estimated due to matrix interference and field duplicate precision.

All soil, groundwater and liquid grab data points are useable. The following provides a summary of data validation results for samples collected at 125-SUMP:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	490	0	100%	1.2%	0%
SVOCs	896	0	100%	2.2%	0%
PCBs	98	0	100%	0%	0%
TPH (GRO and DRO)	28	0	100%	14.2%	0%
Inorganics	322	0	100%	84.7%	6.1%

Table 4.13-1

Summary of Analyte Concentrations for Soil Samples
Metal Chip Bailer Sump (125-SUMP)

Sample ID Date Sampled Depth	125SUMDP-0102N 2/9/99 8 - 12 ft bgs	125SUMDP-0201N 2/9/99 4 - 8 ft bgs	125SUMDP-0202N 2/9/99 8 - 12 ft bgs	125SUMDP-0202D 2/9/99 8 - 12 ft bgs	125SUMDP-0401N 2/9/99 4 - 8 ft bgs	125SUMDP-0402N 2/9/99 8 - 12 ft bgs	125SUMDP-0403N 2/9/99 12 - 16 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	8370	13800	5130	8650	9490	8140	6980
Arsenic	11 4	18 2	24 7	21 6	19 1	15 2	17
Barium	93	165	69 5	76 3	123	90 3	68 5
Beryllium	0 43 J	0 65	0 36 J	0 61	0 52 J	0 49 J	0 35 J
Cadmium	0 57 U	0 63 U	0 59 U	0 61 U	0 59 U	1	0 59 U
Chromium (Total)	11 9	20 7	9 1	13	14 7	12	11 4 D
Cobalt	9 8	15 3	12 1	12	12	9	10 1 D
Copper	24 8	27 4	33 8	33 7	27	26 2	26 2
Iron	19100	34100	28300	28300	27200 B	20100 B	21800 B
Lead	66 9	20	17	14 4	16 4	12	17 D
Manganese	315	701	270	241	355	311	345 D
Nickel	31 6	42 6	43 6	46 7	35 1	32 7	32 2 D
Selenium	0 57 U	0 63 U	0 98	1 2	0 59 U	0 56 U	0 59 U
Thallium	1 3	1 7	1 6	1 8	1.1 J	1 7	1 1 J
Vanadium	22 6	36 6	21 5	32 4	26	29 9	17 1
Zinc	91 4 B	120 B	112 B	129 B	95 4 B	97 9 B	97 7 D
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 035 J	0 072 J	0 047 J	0 055 J	0 061 J	0 044 J	0 12 U
Analyte	**Volatiles by SW8260 (ug/kg)**						
1,1-Dichloroethane	280 U	320 U	300 U	310 U	300 U	280 U	290 U
Benzene	280 U	320 U	300 U	310 U	300 U	280 U	290 U

Table 4.13-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Metal Chip Bailer Sump (125-SUMP)

Sample ID Date Sampled Depth	125SUMDP-0102N 2/9/99 8 - 12 ft bgs	125SUMDP-0201N 2/9/99 4 - 8 ft bgs	125SUMDP-0202N 2/9/99 8 - 12 ft bgs	125SUMDP-0202D 2/9/99 8 - 12 ft bgs	125SUMDP-0401N 2/9/99 4 - 8 ft bgs	125SUMDP-0402N 2/9/99 8 - 12 ft bgs	125SUMDP-0403N 2/9/99 12 - 16 ft bgs
Ethylbenzene	280 U	320 U	300 U	310 U	300 U	280 U	290 U
Toluene	280 U	320 U	300 U	310 U	300 U	280 U	290 U
Xylenes	280 U	320 U	300 U	310 U	300 U	280 U	290 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**						
2-Methylnaphthalene	370 U	420 U	390 U	400 U	390 U	370 U	67 J
Acenaphthene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Anthracene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Benzo(a)anthracene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Benzo(a)pyrene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Benzo(b)fluoranthene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Benzo(g,h,i)perylene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Benzo(k)fluoranthene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Carbazole	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Chrysene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Fluoranthene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Fluorene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Indeno(1,2,3-c,d)pyrene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Naphthalene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Phenanthrene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Pyrene	370 U	420 U	390 U	400 U	390 U	370 U	390 U
Analyte	**PCBs by SW8080 (ug/kg)**						
Aroclor 1254	37 U	42 U	39 U	40 U	39 U	37 U	39 U

Table 4.13-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Metal Chip Bailer Sump (125-SUMP)

Sample ID Date Sampled Depth	125SUMDP-0102N 2/9/99 8 - 12 ft bgs	125SUMDP-0201N 2/9/99 4 - 8 ft bgs	125SUMDP-0202N 2/9/99 8 - 12 ft bgs	125SUMDP-0202D 2/9/99 8 - 12 ft bgs	125SUMDP-0401N 2/9/99 4 - 8 ft bgs	125SUMDP-0402N 2/9/99 8 - 12 ft bgs	125SUMDP-0403N 2/9/99 12 - 16 ft bgs
Analyte	**TPH by M8015D (mg/kg)**						
PHC as Gasoline	0 11 U	0 13 U	0 12 U	0 12 U	0 12 U	0 11 U	0 12 U
PHC C10-C22	66	13 U	14	12 U	12 U	20	12 U

Table 4.13-1

Summary of Analyte Concentrations for Soil Samples
Metal Chip Bailer Sump (125-SUMP)

Sample ID Date Sampled Depth	125SUMDP-0404N 2/9/99 16 - 20 ft bgs	125SUMDP-0404D 2/9/99 16 - 20 ft bgs	125SUMDP-0501N 2/9/99 4 - 8 ft bgs	125SUMDP-0502N 2/9/99 8 - 10 ft bgs	125SUMDP-0601N 2/9/99 0 - 4 ft bgs	125SUMDP-0602N 2/9/99 4 - 8 ft bgs	125SUMDP-0603N 2/9/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	5540	8430	9080	7430	8930	12000	9190
Arsenic	14 2	55 5	20 1	16 4	36 6	21 6	16 2
Barium	215	79 2	67 8	77 8	95 8	104	104
Beryllium	0 29 J	0 41 J	0 23 J	0 46 J	0 65	0 73	0 54 J
Cadmium	0 58 U	0 56 U	0 58 U	0 6	0 59 U	0 58 U	0 59
Chromium (Total)	11 2	11 8	13 4	11 1	15.4	18 1	16 2
Cobalt	15 5	10 3	8 7	7 8	14	11 4	9 8
Copper	24 5	27 1	24 8	27 6	41 4	33 9	28 9
Iron	19500 B	50900	25300 B	22000 B	49800	32500	22300
Lead	10 2	11 3	11 8	13 9	16 6	16 5	13 6
Manganese	296	309	286	234	1020	205	266
Nickel	32 7	35 6	31 8	32	55 1	43 2	37 4
Selenium	0 58 U	0 56 U	0 58 U	0 58 U	0 59 U	0 58 U	0 91
Thallium	0 92 J	1 8	1 2	1 3	1 4	1 5	1 5
Vanadium	18 3	20 9	31 4	30 6	37 2	36 6	32 5
Zinc	83 7 B	64 1 B	101 B	102 B	138 B	119 B	104 B
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 05 J	0 035 J	0 065 J	0 048 J	0 063 J	0 069 J	0 05 J
Analyte	**Volatiles by SW8260 (ug/kg)**						
1,1-Dichloroethane	290 U	280 U	290 U	290 U	140 J	42 J	290 U
Benzene	290 U	280 U	290 U	290 U	33 J	290 U	290 U
Ethylbenzene	290 U	280 U	290 U	290 U	55 J	290 U	290 U

Table 4.13-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Metal Chip Bailer Sump (125-SUMP)

Sample ID Date Sampled Depth	125SUMDP-0404N 2/9/99 16 - 20 ft bgs	125SUMDP-0404D 2/9/99 16 - 20 ft bgs	125SUMDP-0501N 2/9/99 4 - 8 ft bgs	125SUMDP-0502N 2/9/99 8 - 10 ft bgs	125SUMDP-0601N 2/9/99 0 - 4 ft bgs	125SUMDP-0602N 2/9/99 4 - 8 ft bgs	125SUMDP-0603N 2/9/99 8 - 12 ft bgs
Toluene	290 U	280 U	290 U	290 U	170 J	290 U	290 U
Xylenes	290 U	280 U	290 U	290 U	310	90 J	290 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**						
2-Methylnaphthalene	380 U	110 J	380 U	380 U	64 J	3800 U	380 U
Acenaphthene	380 U	370 U	380 U	40 J	390 U	3800 U	380 U
Anthracene	380 U	370 U	380 U	87 J	390 U	3800 U	380 U
Benzo(a)anthracene	380 U	370 U	380 U	200 J	390 U	3800 U	380 U
Benzo(a)pyrene	380 U	370 U	380 U	180 J	390 U	3800 U	380 U
Benzo(b)fluoranthene	380 U	370 U	380 U	250 J	390 U	3800 U	380 U
Benzo(g,h,i)perylene	380 U	370 U	380 U	110 J	390 U	3800 U	380 U
Benzo(k)fluoranthene	380 U	370 U	380 U	100 J	390 U	3800 U	380 U
Carbazole	380 U	370 U	380 U	67 J	390 U	3800 U	380 U
Chrysene	380 U	370 U	380 U	230 J	390 U	3800 U	380 U
Fluoranthene	380 U	370 U	380 U	570	390 U	3800 U	380 U
Fluorene	380 U	370 U	380 U	46 J	130 J	3800 U	380 U
Indeno(1,2,3-c,d)pyrene	380 U	370 U	380 U	91 J	390 U	3800 U	380 U
Naphthalene	380 U	370 U	380 U	380 U	100 J	3800 U	380 U
Phenanthrene	380 U	47 J	380 U	480	290 J	3800 U	380 U
Pyrene	380 U	370 U	380 U	470	390 U	3800 U	380 U
Analyte	**PCBs by SW8080 (ug/kg)**						
Aroclor 1254	38 U	37 U	38 U	38 U	4100	1800	2500
Analyte	**TPH by M8015D (mg/kg)**						
PHC as Gasoline	0 12 U	0 11 U	0 12 U	0.12 U	5 6	0 12 U	0 12 U

Table 4.13-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Metal Chip Bailer Sump (125-SUMP)

Sample ID Date Sampled Depth	125SUMDP-0404N 2/9/99 16 - 20 ft bgs	125SUMDP-0404D 2/9/99 16 - 20 ft bgs	125SUMDP-0501N 2/9/99 4 - 8 ft bgs	125SUMDP-0502N 2/9/99 8 - 10 ft bgs	125SUMDP-0601N 2/9/99 0 - 4 ft bgs	125SUMDP-0602N 2/9/99 4 - 8 ft bgs	125SUMDP-0603N 2/9/99 8 - 12 ft bgs
PHC C10-C22	15	11 U	12 U	12	4000	890	110

Note: Sample IDs 125SUMDP-0202D and 125SUMDP-0404D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.13-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Metal Chip Bailer Sump (125-SUMP)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	13800
Arsenic	86 00	55 5
Barium	140000 00	215
Beryllium	30	0 73
Calcium	NA	64900
Cadmium	300 00	1
Cobalt	10000	15 5
Chromium (Total)	2800 00	20 7
Copper	70000	41 4
Iron	100000	50900
Potassium	NA	2710
Magnesium	NA	24000
Manganese	45000	1020
Sodium	NA	746
Nickel	3700 00	55 1
Lead	2800	66 9
Selenium	10000 00	1 2
Thallium	160	1 8
Vanadium	14000	37 2
Zinc	370000 00	138

Table 4.13-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Metal Chip Bailer Sump (125-SUMP)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Mercury by SW7471		
Mercury	230 00	0 072
Volatiles by SW8260		
Benzene	68 00	0 033
Toluene	520 00	0 17
1,1-Dichloroethane	2300 00	0 14
Ethylbenzene	230 00	0 055
Xylenes	1500 00	0 31
Semivolatiles by SW8270		
Acenaphthene	18000 00	0 04
Anthracene	91000 00	0 087
Benzo(a)anthracene	31 00	0 2
Benzo(a)pyrene	3 10	0 18
Benzo(b)fluoranthene	31 00	0 25
Benzo(g,h,ı)perylene	9100 00	0 11
Benzo(k)fluoranthene	310 00	0 1
Carbazole	2000	0 067
Chrysene	3100 00	0 23
Fluorene	12000 00	0 13
Fluoranthene	12000 00	0 57
Indeno(1,2,3-c,d)pyrene	31 00	0 091

Table 4.13-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Metal Chip Bailer Sump (125-SUMP)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
2-Methylnaphthalene	76000 00	0 11
Naphthalene	22000 00	0 1
Phenanthrene	91000 00	0 48
Pyrene	9100 00	0 47
PCBs by SW8080		
Aroclor 1254	25	4 1
TPH by M8015D		
PHC C10-C22	20000	4000
PHC as Gasoline	8000	5 6

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Table 4.13-3

Summary of Analyte Concentrations for Groundwater Samples
Metal Chip Bailer Sump (125-SUMP)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	125SUMGW-02N 2/9/99
Analyte	**Inorganics (Total) by SW6010 (ug/L)**	
Aluminum	NA	7460
Arsenic	NA	8 8 J
Barium	2000	265
Chromium (Total)	100	11 9
Copper	NA	15 4 J
Iron	NA	12300
Lead	NA	5 4
Manganese	NA	1280
Nickel	100	29 4 J
Thallium	2	1 2 J
Vanadium	NA	23 7 J
Zinc	4700	93 3
Analyte	**Mercury (Total) by SW7471 (ug/L)**	
Mercury	2	0 097 J
Analyte	**Volatiles by SW8260 (ug/L)**	
Acetone	NA	6 J
Methylene Chloride	5	0 38 J
Toluene	1000	0 16 J
Trichloroethene	5	0 3 J
Analyte	**TPH by M8015 (ug/L)**	

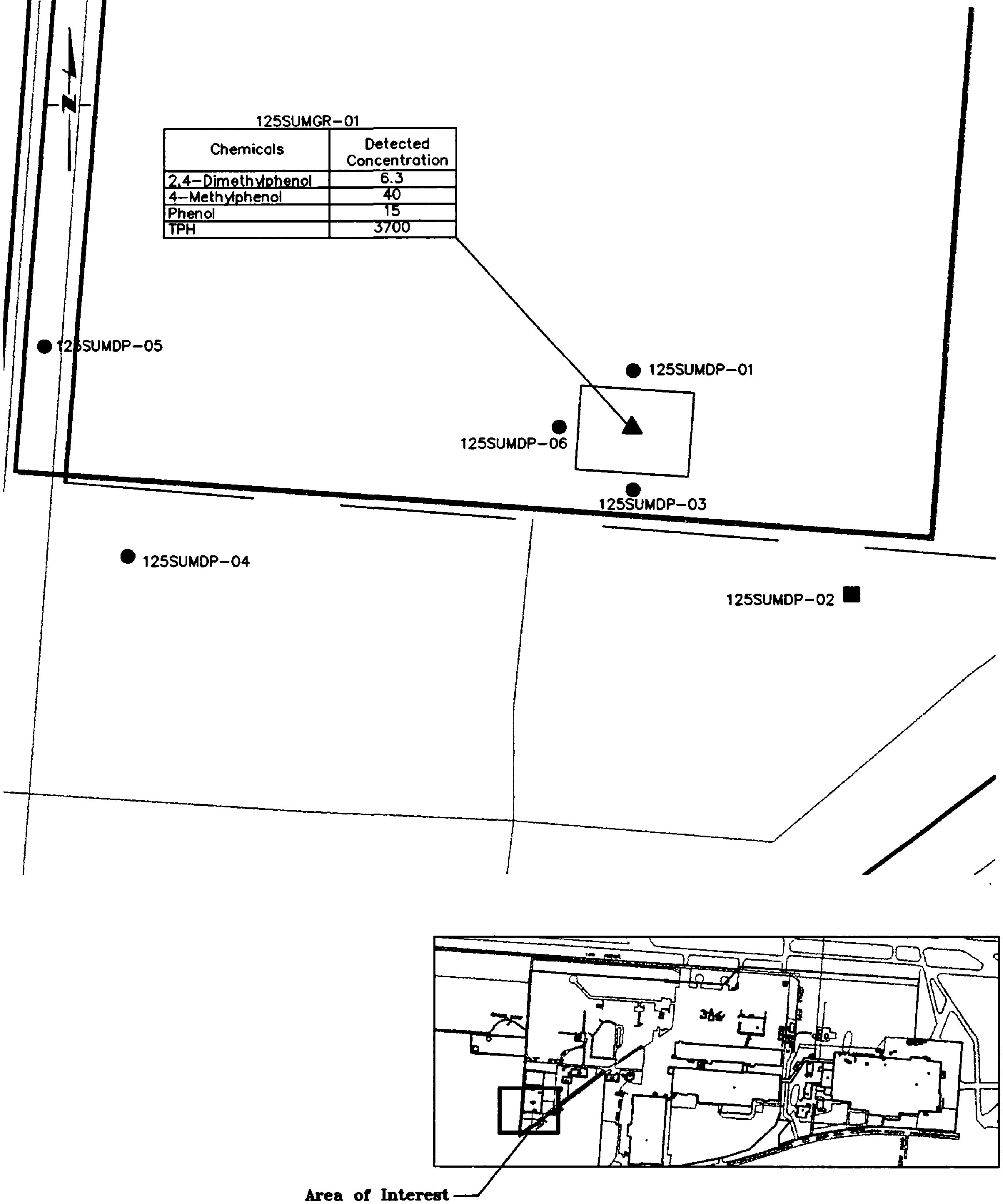
Table 4.13-3

Summary of Analyte Concentrations for Groundwater Samples (Continued) Metal Chip Bailer Sump (125-SUMP)		
Sample ID **Date Sampled**	**VAP Generic Unrestricted Potable Use Standard**	**125SUMGW-02N** **2/9/99**
PHC C10-C22	NA	950

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter



125SUMGR-01

Chemicals	Detected Concentration
2,4-Dimethylphenol	6.3
4-Methylphenol	40
Phenol	15
TPH	3700

Legend
- ● Direct Push Sample Location
- ▲ Liquid Grab Sample Location
- ■ Groundwater Sample Location

0' 15' 30' 60'
SCALE

EARTH TECH

Figure 4.13-2

Metal Chip Bailer Sump (125 SUMP) Groundwater and Liquid Grab Sample Locations and Analyte Concentrations (ug/L)

29179.4.11-15.DWG/.PLT

Table 4.13-4

Summary of Analyte Concentrations for Grab Samples
Metal Chip Bailer Sump (125-SUMP)

Sample ID / Date Sampled	125SUMGR-01N / 2/17/99
Analyte	**TPH by M8015 (ug/l)**
PHC C10-C22	3700
Analyte	**Semivolatiles by SW8270 (ug/l)**
2,4-Dimethylphenol	6 3 J
4-Methylphenol	40 M
Phenol	15

Key:

J	=	Estimated
M	=	A matrix effect was present
ug/L	=	Micrograms per Liter

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Groundwater					
VOCs	35	0	100%	22.9%	2.9%
SVOCs	64	0	100%	0%	0%
PCBs	7	0	100%	0%	0%
TPH (GRO and DRO)	2	0	100%	0%	0%
Inorganics	23	0	100%	0%	14.3%
Liquid Grab					
SVOCs	64	0	100%	1.6%	0%
PCBs	7	0	100%	0%	0%
TPH (GRO and DRO)	2	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.13.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. Metal Chip Bailer Sump (125-SUMP) is recommended for Category 4 designation.

4.14 3-PLENUM

The plenum (3-PLENUM) is a concrete area measuring approximately 80 feet by 36 feet which is located in a subfloor space of Building 3 beneath 3-PLATING. It was designed to collect vapors vented from plating operations occurring above it. Chemicals suspected to be present include heavy metals, acids, and caustics.

4.14.1 Site Summary

Remedial activities were conducted at 3-PLENUM in August 1997. Slag remaining in the area as a result of previous industrial activities was removed and the entire PLENUM area was cleaned. The area was inspected for cracks, drains, and other possible points of water leakage. Following triple rinse of the area, rinseate samples were collected to confirm successful remediation.

4.14.2 Field Activities Conducted

Eight concrete chip samples were collected from 3-PLENUM and were analyzed for metals. Sample locations are shown in Figure 4.14-1. The following chart presents the number of samples collected, as well as analyses performed.

Number of Samples Collected at 3-PLENUM				
Sampling Point	**Soil**	**Groundwater**	**Soil Gas**	**Other (1)**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	--	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Concrete	--	--	--	8
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Concrete chip sample analytical suite: Metals (SW3050/6010).

4.14.3 Results

Numerous metals were detected in the concrete chip samples collected; these concentrations are presented in Table 4.14-1. Aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, silver, vanadium, and zinc were detected at concentrations exceeding their respective Building 3 background concentrations in various samples. However, none of the concentrations exceeded the respective VAP soil standard for industrial land use or the Region IX PRG standard for industrial soil.

PLENCP-04

Chemicals	Detected Concentration
Aluminum	7000
Arsenic	14
Cadmium	20
Chromium	250
Cobalt	5.7
Copper	53
Iron	14,000
Lead	2200
Manganese	350
Nickel	36
Vanadium	16
Zinc	40

PLENCP-03

Chemicals	Detected Concentration
Aluminum	6600
Arsenic	9.8
Cadmium	6
Chromium	55
Cobalt	5.1
Copper	21
Iron	19,000
Lead	91
Manganese	350
Nickel	25
Vanadium	17
Zinc	35

PLENCP-02

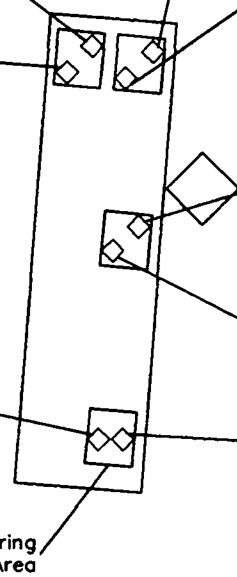
Chemical	Detected Concentration
Aluminum	7700
Cadmium	12
Cobalt	5.2
Copper	29
Iron	13,000
Lead	66
Manganese	450
Vanadium	19
Zinc	30

PLENCP-06

Chemicals	Detected Concentration
Cadmium	0.52
Chromium	24
Iron	11,000
Lead	1200
Manganese	410
Zinc	28

PLENCP-01

Chemicals	Detected Concentration
Cadmium	6.5
Chromium	31
Cobalt	4.9
Iron	11,000
Lead	850
Manganese	350
Silver	2.1
Zinc	30



PLENCP-05

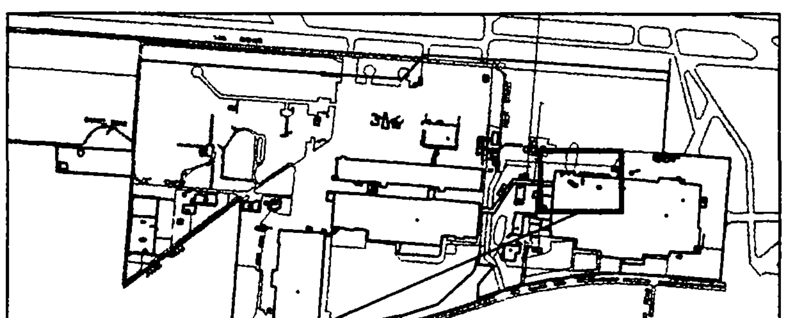
Chemicals	Detected Concentration
Arsenic	19
Cadmium	1.2
Chromium	140
Cobalt	5
Iron	31,000
Lead	170
Manganese	370
Zinc	220

PLENCP-07

Chemicals	Detected Concentration	Duplicate Concentration
Aluminum	7900	7500
Arsenic	ND	11
Cadmium	2.1	0.67
Chromium	190	68
Cobalt	4.9	4.8
Iron	12,000	12,000
Lead	1000	190
Manganese	350	360
Vanadium	18	16
Zinc	38	42

PLENCP-08

Chemicals	Detected Concentration
Aluminum	6600
Cadmium	1.7
Chromium	210
Cobalt	4.4
Iron	11,000
Lead	910
Manganese	360
Zinc	29



Area of Interest

Legend

◇ Concrete Chip Sample Location

ND Not Detected

0' 10' 20' 40'

SCALE

EARTH TECH

Figure 4.14-1

Plenum (3-PLENUM) Concrete Chip Sample Locations and Analyte Concentrations (mg/kg)

29179.4.11-15.DWG/.PLT

Table 4.14-1

Summary of Analyte Concentrations for Concrete Chip Samples
Plenum (3-PLENUM)

Sample ID Date Sampled	VAP Industrial Single Chemical Generic Direct-Contact Soil Standard	Building 3 Maximum Background Concentration for Concrete Chip Samples	PLENCP-01N 2/18/99	PLENCP-02N 2/18/99	PLENCP-03N 2/18/99	PLENCP-04N 2/18/99	PLENCP-05N 2/18/99
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	1000000	6500	6500	7700	6600	7000	6300
Arsenic	86	9 3	9 2	8 6	9.8	14	19
Barium	140000	94 J	57	65	75	72	65
Cadmium	300	0 5 UJ	6.5	12	6	20	1.2
Chromium (Total)	2800	12 J	31	12	55	250	140
Cobalt	10000	4 1 J	4.9	5.2	5.1	5.7	5
Copper	70000 *	18 J	10	29	21	53	15
Iron	100000 *	8400	11000	13000	19000	14000	31000
Lead	2800	5 UJ	850	66	91	2200	170
Manganese	45000 *	250	350	450	350	350	370
Nickel	3700	13 J	11	11	25	36	12
Selenium	10000 *	5 UJ	1 U	1 5 U	1 5 U	0 67 S	1 4 S
Silver	10000	2 U	2.1	2 U	2 U	2 U	2 U
Vanadium	14000	15 J	15	19	17	16	15
Zinc	370000	22 J	30	30	35	40	220

Table 4.14-1

Summary of Analyte Concentrations for Concrete Chip Samples
Plenum (3-PLENUM)

Sample ID Date Sampled	VAP Industrial Single Chemical Generic Direct-Contact Soil Standard	Building 3 Maximum Background Concentration for Concrete Chip Samples	PLENCP-06N 2/18/99	PLENCP-07N 2/18/99	PLENCP-07D 2/18/99	PLENCP-08N 2/18/99
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	1000000	6500	6500	7900	7500	6600
Arsenic	86	9 3	7	9 3	11	8 3
Barium	140000	94 J	76	76	72	65
Cadmium	300	0 5 UJ	0.52	2.1	0.67	1.7
Chromium (Total)	2800	12 J	24	190	68	210
Cobalt	10000	4 1 J	4 1	4.9	4.8	4.4
Copper	70000 *	18 J	11	13	13	12
Iron	100000 *	8400	11000	12000	12000	11000
Lead	2800	5 UJ	1200	1000	190	910
Manganese	45000 *	250	410	350	360	360
Nickel	3700	13 J	9 9	12	12	9 8
Selenium	10000 *	5 UJ	1 6 U	0 4 U	0 49 S	0 75 S
Silver	10000	2 U	2 U	2 U	2 U	2 U
Vanadium	14000	15 J	14	18	16	15
Zinc	370000	22 J	28	38	42	29

Table 4.14-1

Summary of Analyte Concentrations for Concrete Chip Samples (Continued)
Plenum (3-PLENUM)

Sample ID Date Sampled Depth	VAP Industrial Single Chemical Generic Direct-Contact Soil	Building 3 Maximum Background Concentration for Concrete Chip Samples	PLENCP-06N 2/18/99	PLENCP-07N 2/18/99	PLENCP-07D 2/18/99	PLENCP-08N 2/18/99

Note: Shaded cells indicate that the chemical was quantified at a concentration that either exceeds the Ohio VAP Single Chemical Generic Direct-Contact Soil Standard or exceeds background for Building 3 concrete
Sample ID PLENCP-07D is a field duplicate

Key:

*	=	Industrial soil standard for Region IX Preliminary Remedial Goals (PRGs)
B	=	Present in associated method blank
J	=	Estimated
mg/kg	=	Milligrams per kilogram
NA	=	Not available
ND	=	Not detected in background sample(s)
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram
UJ	=	Indicates that the compound was analyzed for but not detected The sample detection limit is an estimation

4.14.4 Data Validation Summary

Eight concrete chip samples and one concrete chip duplicate were collected at 3-PLENUM and were analyzed for inorganics.

Non-detect results for selenium were qualified R and rejected for six concrete chip samples due to low percent recovery of matrix spikes and a high RPD between matrix spike and matrix spike duplicate results. More than 62% of the inorganic data points were estimated due to matrix interference and field duplicate precision.

All concrete chip data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at 3-PLENUM:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Concrete Chip					
Inorganics	198	6	97%	62.1%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.14.5 Recommendations for Further Action

The concrete floor appears to be intact and shows no signs of cracks or physical weaknesses where leaching could occur. Furthermore the undisturbed condition of the concrete would eliminate the potential for any residual compounds in the surface to become accessible to human uptake via dermal or ingestion pathways. Additionally, the basement below the site also serves as a barrier for leaching. Therefore, leaching of contaminants to the subsurface is not anticipated. 3-PLENUM is recommended to be designated Category 4.

4.15 PROCESS SEWERS (PSEWER)

Process wastewater lines connect Building 3, former Building 13, and the coal pile leachate tank to the onsite IWTP. This is industrial sewer system and consists of underground piping installed in 1965 from Building 3, the Coal Pile Leachate Site, and former Building 13 to the IWTP.

4.15.1 Site Summary

The piping was designated Category 7 in the EBS (Reference 213). No investigative sampling has been previously conducted at this site.

4.15.2 Field Activities Conducted

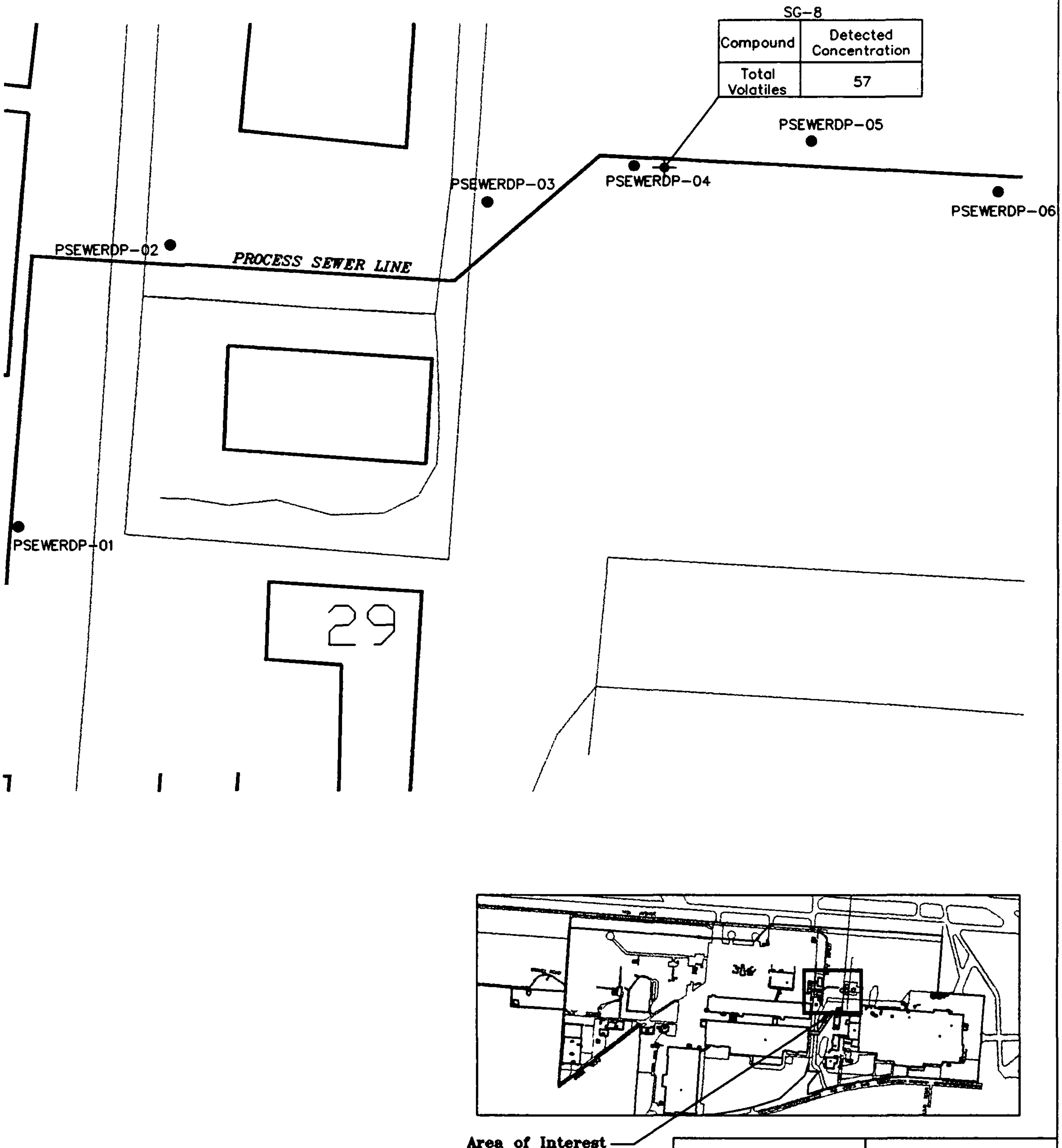
A soil gas survey was performed by collecting 20 samples along the Process Sewers to locate the optimal locations for six proposed boreholes which were advanced using the direct push method. Each borehole was continuously sampled every five feet until groundwater or refusal. Fourteen direct push soil samples and one groundwater sample were collected at PSEWER and analyzed for VOCs, SVOCs, PCBs, metals, GRO and DRO. Also, a sample for vertical conductivity determination was collected. Sample locations are shown in Figure 4.15-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at PSEWER				
Sampling Point	**Soil(1)**	**Groundwater(2)**	**Soil Gas(3)**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	14	1	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	20	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Metals (SW3050/6010), volatile organic compounds (SW8260), semivolatile compounds (SW3550/8270), Diesel range and gasoline range organics (modified SW8015), vertical conductivity, PCBs (SW3550/SW8080), and soil moisture (ASTM D2216).

(2) Groundwater analytical suite: Metals (SW3005/6010), volatile organic compounds (SW8260), semivolatile compounds (SW3510/8270), Diesel range and gasoline range organics (modified SW8015), PCBs (SW3510/SW8080).

(3) Soil gas analytical suite: TCE, TCA, benzene, toluene, ethylbenzene, and xylenes by gas chromatography in the field.



Legend
● Direct Push Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.15-1

Process Sewers
(PSEWER)
Soil Gas Detection (ug/L)
and Sample Locations

29179.4.11-15.DWG/PLT

4.15.3 Results

Mercury, numerous inorganics, TPH, and VOCs were detected in soil samples collected at PSEWER; concentrations are presented in Table 4.15-1. SVOCs were detected in one of the six boreholes from 0 to 4 feet bgs. Table 4.15-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Six boreholes were advanced at PSEWER; depths ranged from 8 to 19 feet bgs. The soils encountered varied from gray silty clay to clay, with gravel and trace sand. Groundwater was encountered between 5 and 12 feet bgs. A vertical conductivity value of 2.65×10^{-8} was reported for sample PSEWER-05 collected at 6-8 feet bgs.

Mercury, DRO and numerous inorganics and VOCs were detected in the groundwater sample collected at PSEWER; concentrations are presented in Table 4.15-3. There were no detected concentrations that exceeded the respective VAP generic potable use standard. Figure 4.15-2 shows the location where groundwater samples were collected.

4.15.4 Data Validation Summary

Fourteen soil samples, two soil duplicates and one groundwater sample were collected at PSEWER and were analyzed for VOCs, SVOCs, PCBs, TPH (GRO and DRO) and inorganics.

On the basis of concentrations detected in associated blanks, methylene chloride results were qualified as non-detect for fifteen soil samples and one groundwater sample. Carbon disulfide results were qualified non-detect for one groundwater sample (PSEWERGW-02N) due to field blank contamination.

During SVOC analysis, non-detect results for one soil sample (PSEWERDP-0101N) were rejected due to low percent recovery of surrogate spikes and matrix spikes.

On the basis of concentrations detected in associated laboratory blanks, sodium results were qualified as non-detect for nine soil samples and mercury results were qualified as non-detect in sample PSEWERDP-0301N. More than 48% of the inorganic data points were estimated due to matrix interference and field duplicate precision.

All groundwater data points are useable. All soil data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at PSEWER:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	560	0	100%	1.5%	2.3%
SVOCs	1024	13	98.7%	1.9%	0%
PCBs	112	0	100%	0%	0%
TPH (GRO and DRO)	32	0	100%	0%	0%
Inorganics	368	0	100%	48.6%	0.5%

Table 4.15-1

Summary of Analyte Concentrations for Soil Samples
Process Sewers (PSEWER)

Sample ID Date Sampled Depth	PSEWERDP-0101N 2/19/99 0 - 4 ft bgs	PSEWERDP-0102N 2/19/99 4 - 8 ft bgs	PSEWERDP-0201N 2/19/99 0 - 4 ft bgs	PSEWERDP-0202N 2/19/99 4 - 8 ft bgs	PSEWERDP-0202D 2/19/99 4 - 8 ft bgs	PSEWERDP-0301N 2/22/99 0 - 4 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	10000	10200	8060	12300	12400	8300
Arsenic	13 9	10 4	11 4	18 2	24 1	7 7
Barium	101	90 3	145	118	127	101
Beryllium	0 29 J	0 38 J	0 37 J	0 53 J	0 44 J	0 26 J
Chromium (Total)	14 2	13 9	11	15 8	17 1	17 6
Cobalt	9 4	8 3	8 6	8 9	12 1	6 4 J
Copper	24 2	20 1	21 7	27 2	29 8	13 5
Iron	21500	18800	19400	30400	30700	17300
Lead	128	9 7	14 9	16 6	14 5	14 2
Manganese	298	237	475	421	671	173
Nickel	23.5	26 8	24	33 6	38 7	12 9
Selenium	0 59 U	0 57 U	0 63 U	0 62 U	0 63 U	1 4
Thallium	1 2 U	0 77 J	1 3 U	1 2 U	0 83 J	1 3 U
Vanadium	23.6	21 5	20 7	32 1	32 4	23 2
Zinc	183	64 3	133	103	108	57 5
Analyte	**Mercury by SW7471 (mg/kg)**					
Mercury	0 055 J	0 036 J	0 056 J	0 066 J	0 046 J	0 037 J
Analyte	**Volatiles by SW8260 (ug/kg)**					
Bromomethane	96 J	630 U	95 J	450 U	500 U	610 U
Methylene Chloride	280 J	380 J	350 J	280 J	340 J	87 J
Styrene	25 J	320 U	270 U	230 U	250 U	300 U

Table 4.15-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Process Sewers (PSEWER)

Sample ID Date Sampled Depth	PSEWERDP-0101N 2/19/99 0 - 4 ft bgs	PSEWERDP-0102N 2/19/99 4 - 8 ft bgs	PSEWERDP-0201N 2/19/99 0 - 4 ft bgs	PSEWERDP-0202N 2/19/99 4 - 8 ft bgs	PSEWERDP-0202D 2/19/99 4 - 8 ft bgs	PSEWERDP-0301N 2/22/99 0 - 4 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
2-Methylphenol	46 J	380 U	420 U	410 U	410 U	430 U
Acenaphthene	110 J	380 U	420 U	410 U	410 U	430 U
Anthracene	210 J	380 U	420 U	410 U	410 U	430 U
Benzo(a)anthracene	1200	380 U	420 U	410 U	410 U	430 U
Benzo(a)pyrene	1100	380 U	420 U	410 U	410 U	430 U
Benzo(b)fluoranthene	1500	380 U	420 U	410 U	410 U	430 U
Benzo(g,h,i)perylene	670	380 U	420 U	410 U	410 U	430 U
Benzo(k)fluoranthene	720	380 U	420 U	410 U	410 U	430 U
bis(2-Ethylhexyl)phthalate	230 J	380 U	420 U	410 U	410 U	430 U
Carbazole	210 J	380 U	420 U	410 U	410 U	430 U
Chrysene	1500	380 U	420 U	410 U	410 U	430 U
di-n-Butylphthalate	140 J	380 U	420 U	410 U	410 U	430 U
Dibenz(a,h)anthracene	230 J	380 U	420 U	410 U	410 U	430 U
Dibenzofuran	67 J	380 U	420 U	410 U	410 U	430 U
Fluoranthene	3400	380 U	420 U	410 U	410 U	430 U
Fluorene	85 J	380 U	420 U	410 U	410 U	430 U
Indeno(1,2,3-c,d)pyrene	640	380 U	420 U	410 U	410 U	430 U
Phenanthrene	1800	380 U	420 U	410 U	410 U	430 U
Pyrene	3100	380 U	420 U	410 U	410 U	430 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC C10-C22	12 U	11 U	13 U	12 U	13 U	13 U

Table 4.15-1

Summary of Analyte Concentrations for Soil Samples
Process Sewers (PSEWER)

Sample ID Date Sampled Depth	PSEWERDP-0401N 2/22/99 0 - 4 ft bgs	PSEWERDP-0402N 2/22/99 4 - 8 ft bgs	PSEWERDP-0402D 2/22/99 4 - 8 ft bgs	PSEWERDP-0403N 2/22/99 12 - 15.5 ft bgs	PSEWERDP-0404N 2/22/99 18 - 19 ft bgs	PSEWERDP-0501N 2/22/99 0 - 4 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	17400	12700	8160	7350	9230	17600
Arsenic	23 4 D	10 4	9 7	11 5	15 5	12
Barium	182 D	79 6	67 2	90 3	73 1	144
Beryllium	0 97	0 36 J	0 27 J	0 29 J	0 38 J	0 38 J
Chromium (Total)	16 6 D	14 6	10 5	10 6	12.1	17 5
Cobalt	14 7 D	10 9	6 9	8 3	7.8	9 8
Copper	32 6 D	19 7	18 1	22 7	29 2	17 8
Iron	34200 D	18800 B	16600 B	19200 B	18500 B	23300 B
Lead	17 6 D	8 8	8 1	10 6	10	15 8
Manganese	289 D	382	217	293	286	318
Nickel	51 2 D	27 7	21 9	27 4	30	17 2
Selenium	1 4	0 57 U	0 56 U	0 56 U	0 54 U	0 99
Thallium	1 3 U	1 1 U	1 1 U	0 86 J	1 1	1 2 U
Vanadium	38 7 D	26	17	17 3	43 2	37 4
Zinc	99 9 D	65 8 B	56 9 B	70 4 B	73.2 B	63 B
Analyte	**Mercury by SW7471 (mg/kg)**					
Mercury	0 028 J	0 11 U	0 11 U	0 11 U	0.11 U	0 12 U
Analyte	**Volatiles by SW8260 (ug/kg)**					
Bromomethane	550 U	500 U	450 U	410 U	410 U	540 U
Methylene Chloride	79 J	97 J	220 U	89 J	78 J	97 J
Styrene	280 U	250 U	220 U	210 U	200 U	270 U

Table 4.15-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Process Sewers (PSEWER)

Sample ID Date Sampled Depth	PSEWERDP-0401N 2/22/99 0 - 4 ft bgs	PSEWERDP-0402N 2/22/99 4 - 8 ft bgs	PSEWERDP-0402D 2/22/99 4 - 8 ft bgs	PSEWERDP-0403N 2/22/99 12 - 15.5 ft bgs	PSEWERDP-0404N 2/22/99 18 - 19 ft bgs	PSEWERDP-0501N 2/22/99 0 - 4 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
2-Methylphenol	420 U	380 U	370 U	370 U	360 U	410 U
Acenaphthene	420 U	380 U	370 U	370 U	360 U	410 U
Anthracene	420 U	380 U	370 U	370 U	360 U	410 U
Benzo(a)anthracene	420 U	380 U	370 U	370 U	360 U	410 U
Benzo(a)pyrene	420 U	380 U	370 U	370 U	360 U	410 U
Benzo(b)fluoranthene	420 U	380 U	370 U	370 U	360 U	410 U
Benzo(g,h,i)perylene	420 U	380 U	370 U	370 U	360 U	410 U
Benzo(k)fluoranthene	420 U	380 U	370 U	370 U	360 U	410 U
bis(2-Ethylhexyl)phthalate	420 U	380 U	370 U	370 U	360 U	410 U
Carbazole	420 U	380 U	370 U	370 U	360 U	410 U
Chrysene	420 U	380 U	370 U	370 U	360 U	410 U
di-n-Butylphthalate	420 U	380 U	370 U	370 U	360 U	410 U
Dibenz(a,h)anthracene	420 U	380 U	370 U	370 U	360 U	410 U
Dibenzofuran	420 U	380 U	370 U	370 U	360 U	410 U
Fluoranthene	420 U	380 U	370 U	370 U	360 U	410 U
Fluorene	420 U	380 U	370 U	370 U	360 U	410 U
Indeno(1,2,3-c,d)pyrene	420 U	380 U	370 U	370 U	360 U	410 U
Phenanthrene	420 U	380 U	370 U	370 U	360 U	410 U
Pyrene	420 U	380 U	370 U	370 U	360 U	410 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC C10-C22	13 U	11 U	11 U	21	62	12 U

Table 4.15-1

Summary of Analyte Concentrations for Soil Samples
Process Sewers (PSEWER)

Sample ID Date Sampled Depth	PSEWERDP-0502N 2/22/99 4 - 8 ft bgs	PSEWERDP-0601N 2/22/99 0 - 4 ft bgs	PSEWERDP-0602N 2/22/99 4 - 8 ft bgs	PSEWERDP-0603N 2/22/99 16 - 17.5 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	7690	17600	8780	7690
Arsenic	16 4	13 9	16 5	8 8
Barium	95 7	164	87 2	43 7
Beryllium	0 29 J	0 56 J	0 3 J	0 29 J
Chromium (Total)	11 2	18 6	11 6	10 1
Cobalt	7 6	11 3	9	6 3
Copper	23 7	26	26 2	18 6
Iron	18800 B	29100 B	23100 B	15300 B
Lead	20 4	14 5	13 8	8
Manganese	385	477	256	301
Nickel	27 4	34 3	28 1	21 2
Selenium	0.59 U	0 94	0 61 U	0 56 U
Thallium	1 2 U	1 3 U	1 2 U	1 1 U
Vanadium	26 6	37 7	20 1	19 6
Zinc	91 9 B	98 5 B	76 8 B	54 5 B
Analyte	**Mercury by SW7471 (mg/kg)**			
Mercury	0 023 J	0.058 J	0 12 U	0 11 U
Analyte	**Volatiles by SW8260 (ug/kg)**			
Bromomethane	460 U	570 U	540 U	430 U
Methylene Chloride	75 J	130 J	120 J	95 J
Styrene	230 U	280 U	270 U	220 U

Table 4.15-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Process Sewers (PSEWER)

Sample ID Date Sampled Depth	PSEWERDP-0502N 2/22/99 4 - 8 ft bgs	PSEWERDP-0601N 2/22/99 0 - 4 ft bgs	PSEWERDP-0602N 2/22/99 4 - 8 ft bgs	PSEWERDP-0603N 2/22/99 16 - 17.5 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
2-Methylphenol	390 U	420 U	400 U	370 U
Acenaphthene	390 U	420 U	400 U	370 U
Anthracene	390 U	420 U	400 U	370 U
Benzo(a)anthracene	390 U	420 U	400 U	370 U
Benzo(a)pyrene	390 U	420 U	400 U	370 U
Benzo(b)fluoranthene	390 U	420 U	400 U	370 U
Benzo(g,h,i)perylene	390 U	420 U	400 U	370 U
Benzo(k)fluoranthene	390 U	420 U	400 U	370 U
bis(2-Ethylhexyl)phthalate	390 U	420 U	400 U	370 U
Carbazole	390 U	420 U	400 U	370 U
Chrysene	390 U	420 U	400 U	370 U
di-n-Butylphthalate	390 U	420 U	400 U	370 U
Dibenz(a,h)anthracene	390 U	420 U	400 U	370 U
Dibenzofuran	390 U	420 U	400 U	370 U
Fluoranthene	390 U	420 U	400 U	370 U
Fluorene	390 U	420 U	400 U	370 U
Indeno(1,2,3-c,d)pyrene	390 U	420 U	400 U	370 U
Phenanthrene	390 U	420 U	400 U	370 U
Pyrene	390 U	420 U	400 U	370 U
Analyte	**TPH by M8015D (mg/kg)**			
PHC C10-C22	12 U	13 U	12 U	48

Table 4.15-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Process Sewers (PSEWER)

Sample ID Date Sampled Depth	PSEWERDP-0502N 2/22/99 4 - 8 ft bgs	PSEWERDP-0601N 2/22/99 0 - 4 ft bgs	PSEWERDP-0602N 2/22/99 4 - 8 ft bgs	PSEWERDP-0603N 2/22/99 16 - 17.5 ft bgs

Note: Sample IDs PSEWERDP-0202D and PSEWERDP-0402D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.15-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Process Sewers (PSEWER)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	17600
Arsenic	86 00	24 1
Barium	140000 00	182
Beryllium	30	0 97
Calcium	NA	127000
Cobalt	10000	14 7
Chromium (Total)	2800 00	18 6
Copper	70000	32 6
Iron	100000	34200
Potassium	NA	3600
Magnesium	NA	49900
Manganese	45000	671
Sodium	NA	246
Nickel	3700 00	51 2
Lead	2800	128
Selenium	10000 00	1 4
Thallium	160	1 1
Vanadium	14000	43 2
Zinc	370000 00	183
Mercury by SW7471		

Table 4.15-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil

Process Sewers (PSEWER)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Mercury	230 00	0 066
Volatiles by SW8260		
Bromomethane	NA	0 096
Methylene Chloride	990 00	0 38
Styrene	1700 00	0 025
Semivolatiles by SW8270		
Acenaphthene	18000 00	0 11
Anthracene	91000 00	0 21
bis(2-Ethylhexyl)phthalate	860 00	0 23
Benzo(a)anthracene	31 00	1 2
Benzo(a)pyrene	3 10	1 1
Benzo(b)fluoranthene	31 00	1 5
Benzo(g,h,i)perylene	9100 00	0 67
Benzo(k)fluoranthene	310 00	0 72
Carbazole	2000	0 21
Chrysene	3100 00	1 5
Dibenz(a,h)anthracene	3 10	0 23
Dibenzofuran	3200	0 067
di-n-Butylphthalate	NA	0 14
Fluorene	12000 00	0 085
Fluoranthene	12000 00	3 4

Table 4.15-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Process Sewers (PSEWER)		
Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Indeno(1,2,3-c,d)pyrene	31 00	0 64
2-Methylphenol	NA	0 046
Phenanthrene	91000 00	1 8
Pyrene	9100 00	3 1
TPH by M8015D		
PHC C10-C22	20000	62

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Table 4.15-3

Summary of Analyte Concentrations for Groundwater Samples
Process Sewers (PSEWER)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	PSEWERGW-02N 2/19/99
Analyte	**Inorganics (Total) by SW6010 (ug/L)**	
Aluminum	NA	248000 D
Arsenic	NA	340 D
Barium	2000	410 D
Beryllium	4	1 3
Cadmium	5	0 66
Chromium (Total)	100	49 D
Cobalt	NA	250 D
Copper	NA	860 D
Iron	NA	528000 D
Lead	NA	340 D
Manganese	NA	14000 D
Nickel	100	78 D
Thallium	2	1 4 M
Vanadium	NA	580 D
Zinc	4700	3200 D
Analyte	**Mercury (Total) by SW7471 (ug/L)**	
Mercury	2	1 3
Analyte	**Volatiles by SW8260 (ug/L)**	
Carbon Disulfide	880	0 11 J
Methylene Chloride	5	0 33 J
Toluene	1000	0 14 J

Table 4.15-3

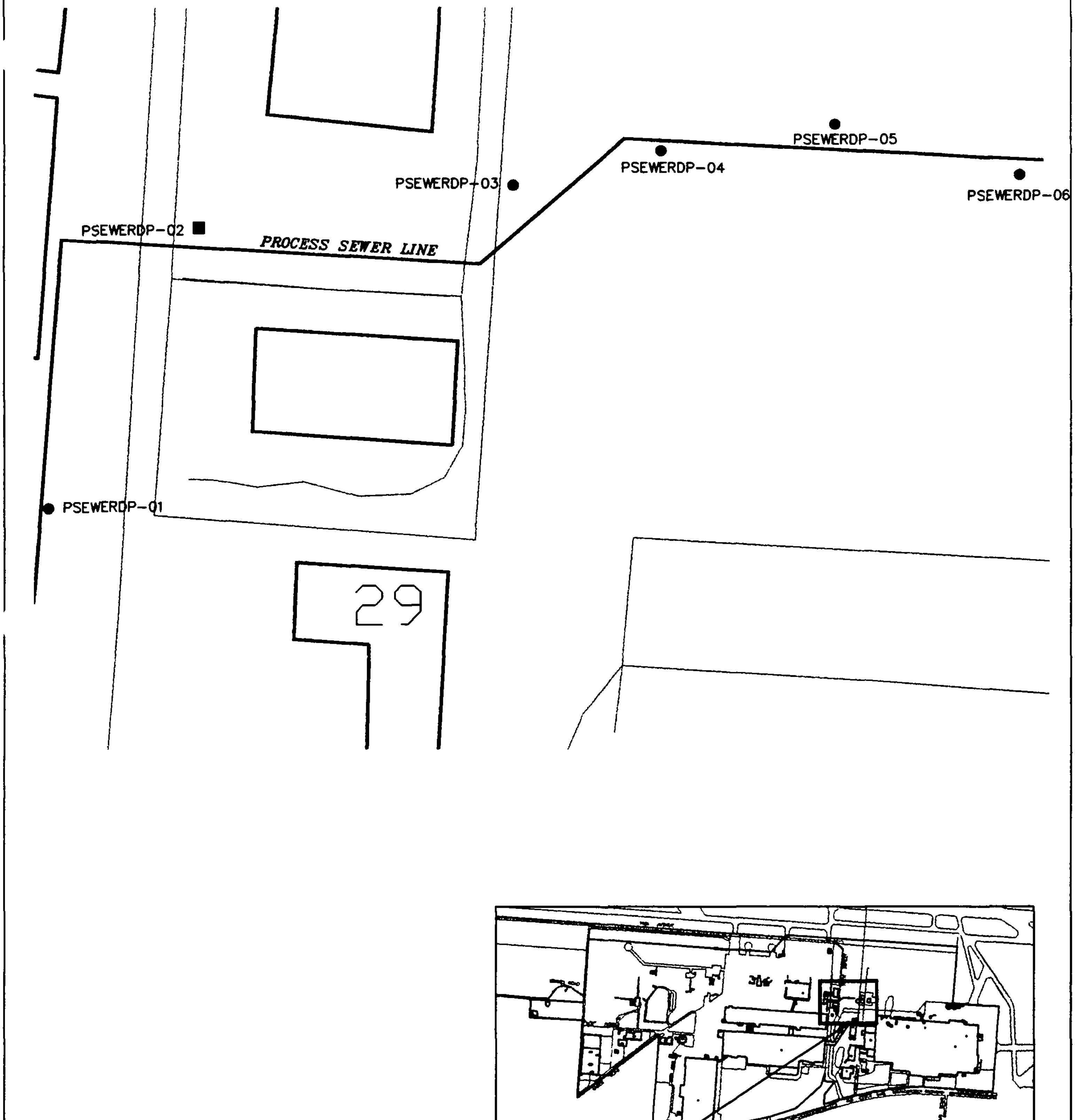
Summary of Analyte Concentrations for Groundwater Samples (Continued)
Process Sewers (PSEWER)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	PSEWERGW-02N 2/19/99
Analyte	**TPH by M8015 (ug/L)**	
PHC C10-C22	NA	290

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
M	=	A matrix effect was present
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter



Legend
- Direct Push Sample Location
- Groundwater Sample Location

EARTH TECH

Figure 4.15-2

Process Sewers (PSEWER) Groundwater Sample Locations

29179.4.11-15.DWG/.PLT

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Groundwater					
VOCs	35	0	100%	2.9%	5.7%
SVOCs	64	0	100%	14.1%	0%
PCBs	7	0	100%	0%	0%
TPH (GRO and DRO)	2	0	100%	0%	0%
Inorganics	23	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.15.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. PSEWER is recommended for Category 4 designation.

4.16 QUENCH TANK PITS (3-HTA)

Four quench tank pits were located in the Heat Treatment Area (HTA) of Building 3. These were the north and south quench tank pits, the glycol quench tank pit, and the oil quench tank pit. All pits have been cleaned and backfilled.

4.16.1 Site Summary

For each of three pits, PCB site characterization and wipe samples were not collected, based on generators' knowledge and visual inspections. The remaining quench tank pit, located between Columns H49 and H51 (3-HTA), contained three quench tanks. For this location, one composite site characterization sample was collected from pit liquid waste prior to cleaning; analyses indicated that PCBs were not present above the detection limit (1.0 $\mu g/100\ cm^2$). Therefore, PCB wipe samples were not collected from this site. All four quench tank pits are considered clean for closure in accordance with TSCA regulations (Reference 191). However, due to the contents of the pits and the limited amount of data collected, direct push sampling was recommended around the perimeter of each pit, with analysis for potential contaminants of concern including VOCs, SVOCs, TPH, and metals.

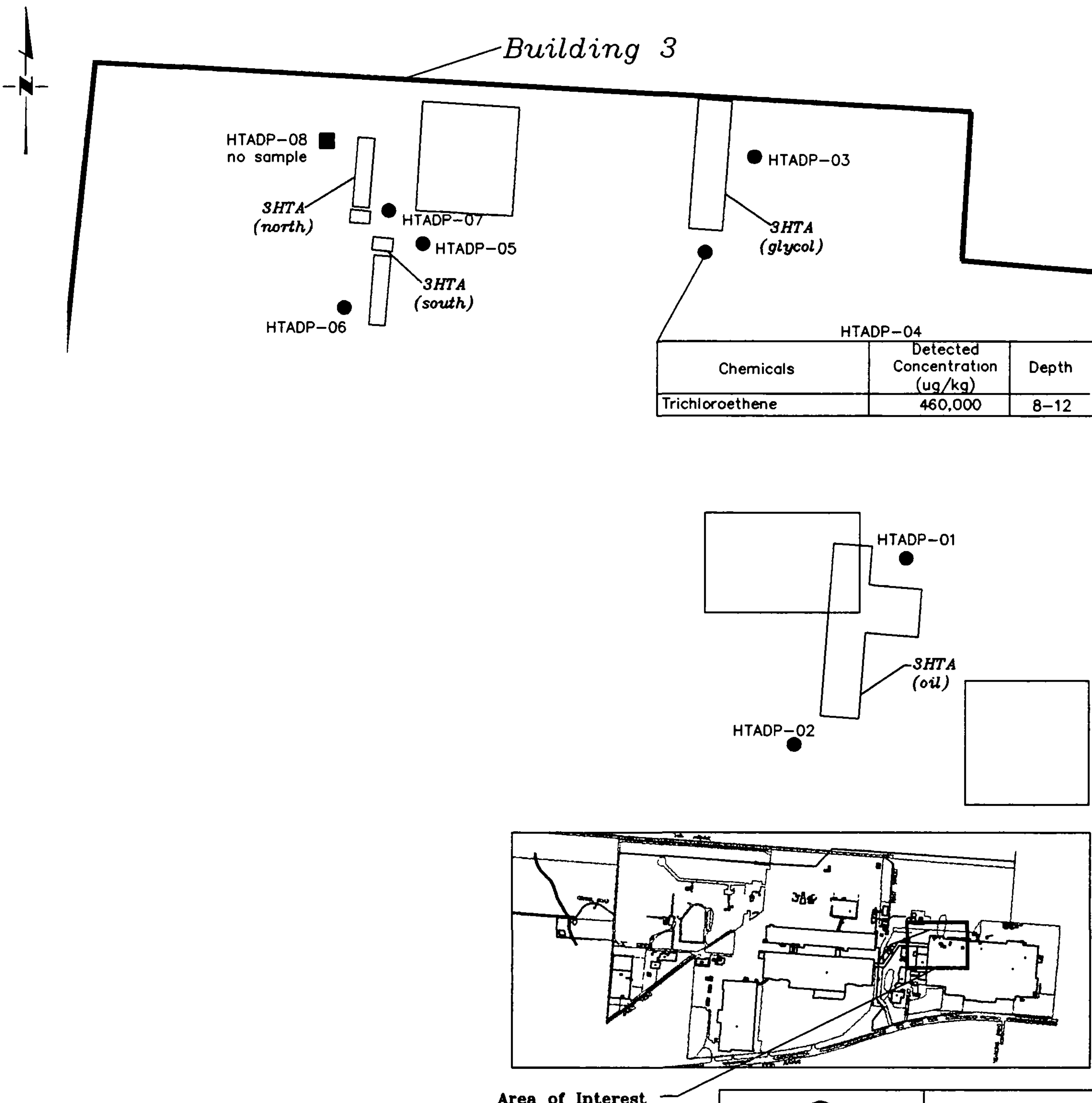
4.16.2 Field Activities Conducted

Eight boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Eleven direct push soil samples and one groundwater sample were collected at 3-HTA and analyzed for VOCs, SVOCs, metals, GRO and DRO. A sample for vertical conductivity determination was collected. Sample locations are shown in Figure 4.16-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at Quench Tank Pits (3-HTA)				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	11	1	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Volatile organic compounds (SW8260), semivolatile organic compounds, diesel and gasoline range organics (modified SW8015), metals (SW3050/SW6010), and soil moisture (ASTM D2216).

(2) Groundwater analytical suite: Volatile organic compounds (SW8260), semivolatile organic compounds, diesel and gasoline range organics (modified SW8015), metals (SW3050/SW6010).



HTADP-04

Chemicals	Detected Concentration (ug/kg)	Depth
Trichloroethene	460,000	8-12

Legend

● Direct Push Sample Location

0' 15' 30' 60'
SCALE

EARTH TECH

Figure 4.16-1

Quench Tank Pits (3-HTA) Soil Sample Locations and Analyte Concentrations (ug/kg)

29179.4 16-19.DWG/.PLT

4.16.3 Results

Mercury, TPH and numerous inorganics, VOCs and SVOCs were detected in soil samples collected at 3-HTA Quench Tank Pits; concentrations are presented in Table 4.16-1. Table 4.16-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. TCE was detected at a concentration exceeding the adjusted standard in borehole HTADP-04.

Soils encountered ranged from a yellow brown silty clay to a dark brown clayey silt mixed with gravels that increased in size with depth. A vertical conductivity value of 3.510^{-8} cm/s was reported for sample HTA-03 collected at 12-15 feet bgs. This it typical of glacial till unconsolidated deposits. Based on the observed clay lenses and clay content of soils encountered within the HTA borings, and the low conductivity, the potential for contaminant leaching to groundwater is limited. Further investigation at this site will be conducted to assess the potential of contaminant migration to groundwater.

Numerous inorganics, VOCs and SVOCs were detected in the groundwater sample collected at 3-HTA Quench Tank Pits; concentrations are presented in Table 4.16-3. Methylene chloride was detected at a concentration exceeding the VAP generic unrestricted potable use standard. Figure 4.16-2 shows the location where samples were collected.

4.16.4 Data Validation Summary

Twenty soil samples, three soil duplicates and one groundwater sample were collected at 3-HTA and were analyzed for VOCs, SVOCs, TPH (GRO and DRO) and inorganics.

Methylene chloride was qualified non-detect for three soil samples and one groundwater sample as a result of field blank contamination.

All SVOC detects were qualified J and all non-detects UJ for three soil samples (HTADP-0602N, HTADP-0101N and HTADP-0102N) due to SVOC holding time exceedance.

All soil and groundwater data points are useable. The following provides a summary of data validation results for samples collected at 3-HTA:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	805	0	100%	4.0%	0.2%
SVOCs	1472	0	100%	11.4%	0%
TPH (GRO and DRO)	46	0	100%	17.4%	0%
Inorganics	658	0	100%	9.6%	0%

Table 4.16-1

Summary of Analyte Concentrations for Soil Samples
Quench Tank Pits (3-HTA)

Sample ID / Date Sampled / Depth	HTADP-0101N 2/9/99 4 - 8 ft bgs	HTADP-0102N 2/9/99 8 - 12 ft bgs	HTADP-0201N 2/9/99 4 - 8 ft bgs	HTADP-0202N 2/9/99 8 - 12 ft bgs	HTADP-0202D 2/9/99 8 - 12 ft bgs	HTADP-0203N 2/9/99 12 - 16 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	8100	9900	6640	5400	7350	6260
Arsenic	25 1	12 1	15 7	14 9	17 9	15 8
Barium	78 6	118	85 1	67	129	80 1
Beryllium	0 49 J	0 51 J	0 36 J	0 26 J	0 34 J	0 34 J
Cadmium	0 76	0 59 U	0 9	0 78	0 72	0 62
Chromium (Total)	12 5	13 8	10 1	8 7	11 1	11 2
Cobalt	10 4	11 3	8 7	11 9	11	8 7
Copper	33 2	16 8	26	25 8	28	24 9
Iron	27700	21400	19500	19300	22300	21500
Lead	14 8	16 1	10 7	10 8	12	10 4
Manganese	315	880	270	313	420	366
Nickel	41	17 1	30 7	32 3	36 3	31 9
Selenium	0 58 U	0 59 U	0 57 U	1 1	0 61 U	0 56 U
Thallium	0 81 J	1 2 U	0 86 J	1 1 U	1.2 U	0 88 J
Vanadium	34 1	32 6	24 5	17 3	25 8	22 8
Zinc	134	64 6	89 8	101	110	89
Analyte	**Mercury by SW7471 (mg/kg)**					
Mercury	0 051 J	0 041 J	0 041 J	0 037 J	0 042 J	0 042 J
Analyte	**Volatiles by SW8260 (ug/kg)**					
1,1,1-Trichloroethane	290 U	300 U	280 U	320	300 U	180 J
1,1-Dichloroethane	290 U	300 U	280 U	280 U	300 U	280 U

Table 4.16-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Quench Tank Pits (3-HTA)

Sample ID Date Sampled Depth	HTADP-0101N 2/9/99 4 - 8 ft bgs	HTADP-0102N 2/9/99 8 - 12 ft bgs	HTADP-0201N 2/9/99 4 - 8 ft bgs	HTADP-0202N 2/9/99 8 - 12 ft bgs	HTADP-0202D 2/9/99 8 - 12 ft bgs	HTADP-0203N 2/9/99 12 - 16 ft bgs
Chloroform	290 U	300 U	280 U	32 J	300 U	280 U
cis-1,2-Dichloroethene	140 U	150 U	140 U	140 U	150 U	140 U
Methylene Chloride	290 U	300 U	280 U	55 J	300 U	280 U
Trichloroethene	290 U	300 U	280 U	130 J	47 J	150 J
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
bis(2-Ethylhexyl)phthalate	380 U	390 U	370 U	370 U	50 J	370 U
Fluoranthene	380 U	390 U	370 U	370 U	400 U	370 U
Naphthalene	380 U	390 U	370 U	370 U	400 U	370 U
Phenanthrene	380 U	390 U	370 U	370 U	400 U	370 U
Pyrene	380 U	390 U	370 U	370 U	400 U	370 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC as Gasoline	0 12 U	0 12 U	0 11 U	0 11 U	0 12 U	0 11 U
PHC C10-C22	12	57	11 U	11 U	49	42

Table 4.16-1

Summary of Analyte Concentrations for Soil Samples
Quench Tank Pits (3-HTA)

Sample ID Date Sampled Depth	HTADP-0204N 2/9/99 16 - 19 ft bgs	HTADP-0301N 2/8/99 4 - 8 ft bgs	HTADP-0302N 2/8/99 8 - 12 ft bgs	HTADP-0303N 2/8/99 16 - 20 ft bgs	HTADP-0304N 2/8/99 12 - 15 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**				
Aluminum	6500	5930	12500	7870	7860
Arsenic	19.6	18.6	16.2	17.6	13.7
Barium	102	74.8	141	80.5	68.5
Beryllium	0.34 J	0.32 J	0.69	0.42 J	0.37 J
Cadmium	0.89	0.62	0.56 U	0.67	0.62
Chromium (Total)	13	9.3	16.8	11.4	11.4
Cobalt	10.5	9.3	9.5	9.3	8.5
Copper	28	29.3	21.2	25	25.1
Iron	25600	22900	29200	22100	21200
Lead	12.7	12.6	12.5	10.9	12
Manganese	332	354	396	336	356
Nickel	34.5	37.2	24.5	32.5	28.7
Selenium	1.1	0.57 U	0.56 U	0.59 U	0.56 U
Thallium	0.84 J	0.74 J	0.93 J	1 J	1.1 U
Vanadium	23.6	20.4	34.1	25.2	25.2
Zinc	139	109	74.6	102	84.3
Analyte	**Mercury by SW7471 (mg/kg)**				
Mercury	0.12	0.059 J	0.045 J	0.049 J	0.037 J
Analyte	**Volatiles by SW8260 (ug/kg)**				
1,1,1-Trichloroethane	140 J	1100 J	280 U	5900 U	280 U
1,1-Dichloroethane	290 U	400 J	280 U	5900 U	280 U

Table 4.16-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Quench Tank Pits (3-HTA)

Sample ID Date Sampled Depth	HTADP-0204N 2/9/99 16 - 19 ft bgs	HTADP-0301N 2/8/99 4 - 8 ft bgs	HTADP-0302N 2/8/99 8 - 12 ft bgs	HTADP-0303N 2/8/99 16 - 20 ft bgs	HTADP-0304N 2/8/99 12 - 15 ft bgs
Chloroform	290 U	1400 U	280 U	5900 U	280 U
cis-1,2-Dichloroethene	140 U	700 J	400	1900 J	140 U
Methylene Chloride	290 U	370 J	280 U	1400 J	280 U
Trichloroethene	84 J	37000	710	150000	280 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
bis(2-Ethylhexyl)phthalate	380 U	380 U	370 U	57 J	370 U
Fluoranthene	380 U	380 U	370 U	390 U	370 U
Naphthalene	380 U	380 U	370 U	390 U	370 U
Phenanthrene	380 U	380 U	370 U	390 U	370 U
Pyrene	380 U	380 U	370 U	390 U	370 U
Analyte	**TPH by M8015D (mg/kg)**				
PHC as Gasoline	0.12 U	0 11 U	0.31	6 9	0 11 U
PHC C10-C22	18	11 U	40	12 U	12

Table 4.16-1

Summary of Analyte Concentrations for Soil Samples
Quench Tank Pits (3-HTA)

Sample ID Date Sampled Depth	HTADP-0401N 2/8/99 4 - 8 ft bgs	HTADP-0401D 2/8/99 4 - 8 ft bgs	HTADP-0402N 2/8/99 8 - 12 ft bgs	HTADP-0501N 2/8/99 4 - 5 ft bgs	HTADP-0502N 2/8/99 8 - 10 ft bgs	HTADP-0503N 2/8/99 13 - 15 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	5490	6950	4140	11800	7190	6490
Arsenic	16 D	17 2	16.3	17 5	16 5	11 2
Barium	116	111	41 2	186	102	77 3
Beryllium	0 24 J	0 36 J	0 22 J	1 2	0 38 J	0 35 J
Cadmium	0 78	0 83	0 59 J	0 64 U	0 97	0 6
Chromium (Total)	10 4 D	12 5	7 5	15 4	11	9 7
Cobalt	8 6	10	5 7 J	23 9	10 2	7 2
Copper	25 4	27 5	67 4	34 6	26 7	20 8
Iron	20800 D	21800	17500	29300	21900	14800
Lead	14 2 D	36	10 3	15 2	12	8 8
Manganese	310 D	342	146	655	341	277
Nickel	28 9	35 1	28	48 1	36	23 1
Selenium	0 58 U	0.58 U	0 87	0 64 U	0 6 U	0 55 U
Thallium	1 2 U	0 76 J	1 2 U	1 3 U	0 9 J	1 1 U
Vanadium	19 3	21 4	33 3	25 9	28 9	33 2
Zinc	100 D	105	90	96 5	102	63.5
Analyte	**Mercury by SW7471 (mg/kg)**					
Mercury	0 046 J	0 041 J	0 027 J	0 072 J	0 047 J	0 043 J
Analyte	**Volatiles by SW8260 (ug/kg)**					
1,1,1-Trichloroethane	200 J	960 U	15000 U	320 U	300 U	280 U
1,1-Dichloroethane	170 J	960 U	7400 J	320 U	300 U	280 U

Table 4.16-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Quench Tank Pits (3-HTA)

Sample ID Date Sampled Depth	HTADP-0401N 2/8/99 4 - 8 ft bgs	HTADP-0401D 2/8/99 4 - 8 ft bgs	HTADP-0402N 2/8/99 8 - 12 ft bgs	HTADP-0501N 2/8/99 4 - 5 ft bgs	HTADP-0502N 2/8/99 8 - 10 ft bgs	HTADP-0503N 2/8/99 13 - 15 ft bgs
Chloroform	1200 U	110 J	15000 U	320 U	93 J	280 U
cis-1,2-Dichloroethene	200 J	80 J	9500	160 U	150 U	140 U
Methylene Chloride	1200 U	960 U	15000 U	320 U	300 U	280 U
Trichloroethene	17000	25000	460000	320 U	300 U	280 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
bis(2-Ethylhexyl)phthalate	120 J	380 U	390 U	420 U	400 U	360 U
Fluoranthene	380 U	380 U	390 U	420 U	400 U	360 U
Naphthalene	380 U	380 U	390 U	420 U	400 U	360 U
Phenanthrene	380 U	380 U	390 U	420 U	400 U	360 U
Pyrene	380 U	380 U	390 U	420 U	400 U	360 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC as Gasoline	0 22	0 12	18	0.13 U	0 12 U	0 11 U
PHC C10-C22	42	12 U	19	13 U	58	55

Table 4.16-1

Summary of Analyte Concentrations for Soil Samples
Quench Tank Pits (3-HTA)

Sample ID Date Sampled Depth	HTADP-0504N 2/8/99 18 - 19 ft bgs	HTADP-0601N 2/8/99 4 - 8 ft bgs	HTADP-0602N 2/8/99 8 - 11 ft bgs	HTADP-0701N 2/8/99 4 - 8 ft bgs	HTADP-0701D 2/8/99 4 - 8 ft bgs	HTADP-0702N 2/8/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	6400	12700	8800	9260	11900	2930
Arsenic	15	17	16 9	17 5	18 8	4 7
Barium	77 5	105	99 5	117	140	130
Beryllium	0 37 J	0 42 J	0 42 J	0 51 J	0 63	0 1 J
Cadmium	0 59	0 6 U	0 63	0 73	0 64	0 52 U
Chromium (Total)	11 2	19 4	14 6	13 8	16 1	5 9
Cobalt	7 8	11 4	10 6	11 4	13 4	2 4 J
Copper	24 5	27 1	26 7	26 9	30 1	7 1
Iron	19100	27000	24900	21600	24600 D	6520
Lead	10 7	12 9	10 7	12 1	13 D	3 6
Manganese	247	211	247	373	676 D	136
Nickel	28 6	27 6	28 8	38 1	50 3	8 1
Selenium	0 59 U	0 6 U	0 86	0 57 U	0 59 U	0 52 U
Thallium	0 89 J	0 8 J	1 1 U	2	1 4	1 U
Vanadium	25 8	34 4	30 1	34 3	37 9	9 9
Zinc	86 6	81 6	90 4	97 3 B	98 9 D	28 6 B
Analyte	**Mercury by SW7471 (mg/kg)**					
Mercury	0 038 J	0 054 J	0 036 J	0 058 J	0 053 J	0 024 J
Analyte	**Volatiles by SW8260 (ug/kg)**					
1,1,1-Trichloroethane	290 U	300 U	280 U	290 U	300 U	260 U
1,1-Dichloroethane	290 U	300 U	280 U	290 U	300 U	260 U
Chloroform	290 U	300 U	280 U	290 U	300 U	260 U

Table 4.16-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Quench Tank Pits (3-HTA)

Sample ID Date Sampled Depth	HTADP-0504N 2/8/99 18 - 19 ft bgs	HTADP-0601N 2/8/99 4 - 8 ft bgs	HTADP-0602N 2/8/99 8 - 11 ft bgs	HTADP-0701N 2/8/99 4 - 8 ft bgs	HTADP-0701D 2/8/99 4 - 8 ft bgs	HTADP-0702N 2/8/99 4 - 8 ft bgs
cis-1,2-Dichloroethene	150 U	150 U	140 U	140 U	150 U	130 U
Methylene Chloride	290 U	300 U	280 U	290 U	62 J	260 U
Trichloroethene	290 U	44 J	280 U	290 U	300 U	260 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
bis(2-Ethylhexyl)phthalate	47 J	380 J	310 J	380 U	390 U	110 J
Fluoranthene	390 U	400 U	69 J	380 U	390 U	340 U
Naphthalene	390 U	400 U	41 J	380 U	390 U	340 U
Phenanthrene	390 U	400 U	85 J	380 U	390 U	340 U
Pyrene	390 U	400 U	47 J	380 U	390 U	340 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC as Gasoline	0 12 U	0 12 U	0 11 U	0 11 U	0 12 U	0 1 U
PHC C10-C22	37	31	52	14	12 U	20

Note: Sample IDs HTADP-0202D, HTADP-0401D and HTADP-0701D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.16-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Quench Tank Pits (3-HTA)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
Inorganics by SW6010		
Aluminum	1000000 00	12700
Arsenic	25 10000	25 1
Barium	140000 00	186
Beryllium	1 20000	1.2
Calcium	NA	137000
Cadmium	0 97000	0 97
Cobalt	10000	23 9
Chromium (Total)	19 40000	19 4
Copper	70000	67 4
Iron	100000	29300
Potassium	NA	2850
Magnesium	NA	70900
Manganese	45000	880
Sodium	NA	349
Nickel	3700 00	50 3
Lead	NA	36
Selenium	10000 00	1 1
Thallium	160	2
Vanadium	14000	37 9
Zinc	370000 00	139

Table 4.16-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Quench Tank Pits (3-HTA)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Mercury by SW7471		
Mercury	230 00	0 12
Volatiles by SW8260		
1,1-Dichloroethane	2300 00	7 4
cis-1,2-Dichloroethene	1200 00	9 5
Methylene Chloride	1 40000	1 4
1,1,1-Trichloroethane	1400 00	1 1
Trichloroethene	149 81776	460
Chloroform	0 11000	0 11
Semivolatiles by SW8270		
bis(2-Ethylhexyl)phthalate	0 38000	0 38
Fluoranthene	12000 00	0 069
Naphthalene	22000 00	0 041
Phenanthrene	91000 00	0 085
Pyrene	9100 00	0 047
TPH by M8015D		
PHC C10-C22	NA	58
Total Petroleum Hydrocarbons	NA	18

Table 4.16-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Quench Tank Pits (3-HTA)		
Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Table 4.16-3

Summary of Analyte Concentrations for Groundwater Samples
Quench Tank Pits (3-HTA)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	HTADP-08GW 2/8/99
Analyte	**Inorganics (Total) by SW6010 (ug/L)**	
Aluminum	NA	189 J
Barium	2000	52 8 J
Chromium (Total)	100	44 7
Copper	NA	17 6 J
Iron	NA	4240
Manganese	NA	46 4
Nickel	100	32 J
Zinc	4700	104
Analyte	**Volatiles by SW8260 (ug/L)**	
Acetone	NA	11
Methylene Chloride	5	6.1
Toluene	1000	0 19 J
Trichloroethene	5	0 13 J
Analyte	**Semivolatiles by SW8270 (ug/L)**	
bis(2-Ethylhexyl)phthalate	NA	7 6 J

Table 4.16-3

Summary of Analyte Concentrations for Groundwater Samples (Continued) Quench Tank Pits (3-HTA)		
Sample ID **Date Sampled**	**VAP Generic Unrestricted Potable Use Standard**	**HTADP-08GW** **2/8/99**

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter

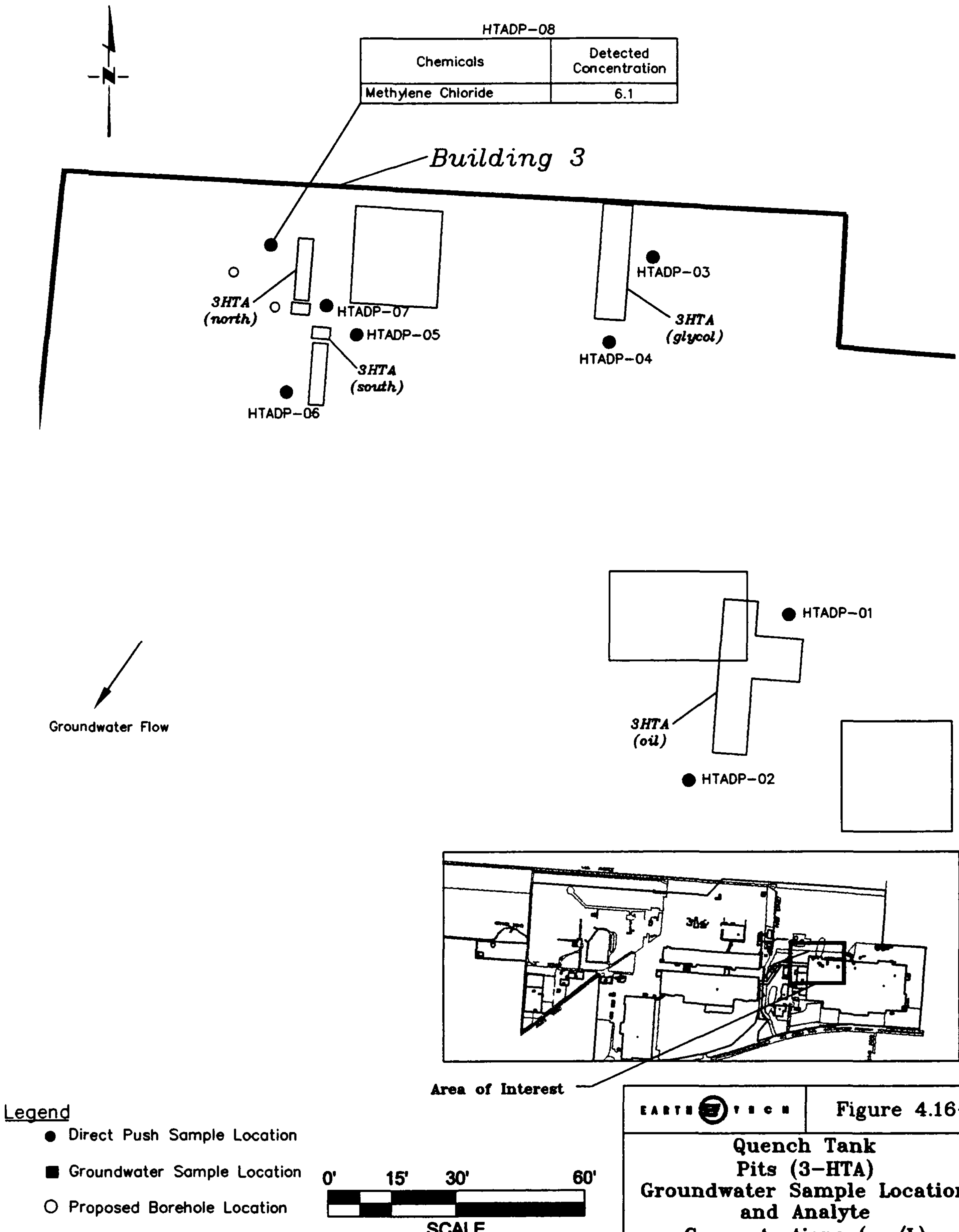


Figure 4.16-2

Quench Tank Pits (3-HTA) Groundwater Sample Location and Analyte Concentrations (ug/L)

29179.4.16-19.DWG/PLT

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Groundwater					
VOCs	35	0	100%	5.7%	2.9%
SVOCs	64	0	100%	1.6%	0%
TPH (GRO and DRO)	2	0	100%	0%	0%
Inorganics	23	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.16.5 Recommendations for Further Action

As discussed in Section 4.16.3, TCE is the only analyte detected at a concentration that exceeded adjusted VAP soil standards. Methylene chloride was detected in groundwater at a concentration exceeding the unrestricted potable use standard.

In accordance with OAC 3745-300-07(D)(2), complete pathways must be determined for 3-HTA. The potentially complete pathway is exposure to groundwater containing chemicals of concern which have leached from soil. On-site or off-site receptors may be exposed to groundwater in the following ways:

- Ingestion of chemicals of concern if groundwater is used as a drinking water source.
- Dermal contact with chemicals of concern if groundwater is used for bathing/showering or is contacted incidentally during other potable or process use by receptors.
- Inhalation of VOCs released from groundwater if groundwater is used for bathing/showering or inhaled incidentally during other potable or process use by receptors.

To determine whether TCE in soil is leaching to groundwater, additional soil and groundwater sampling is recommended in the vicinity of the elevated TCE hits. Direct push boreholes are recommended within a 10-foot radius of HTADP-04. The boreholes should be sampled every 5 feet, advanced to groundwater, and groundwater should be sampled. Samples will be analyzed for TCE only. Proposed sample locations are shown in Figure 4.16-2.

This additional sampling will determine the vertical and horizontal extent of contamination. On the basis of this determination, either a baseline risk assessment or further sampling will be conducted. 3-HTA quench tank pits should remain designated Category 7.

4.17 SALT BATH FURNACE PIT (3-HTA)

A salt bath furnace pit is located between Columns J-53 and J-55 in the northwest section of Building 3. This pit was cleaned and backfilled.

4.17.1 Site Summary

One site characterization and two confirmatory PCB wipe samples were collected from this pit. PCB concentrations of the confirmatory samples were all non-detectable (<1.0 µg/100 cm^2) and indicated that the pit was clean for closure in accordance with TSCA regulations (Reference 160, 191). Direct push sampling and analysis for TPH and metals was recommended around the perimeter of the pit. Salt Bath Furnace Pit (3-HTA) was designated as Category 7 in the EBS (Reference 213).

4.17.2 Field Activities Conducted

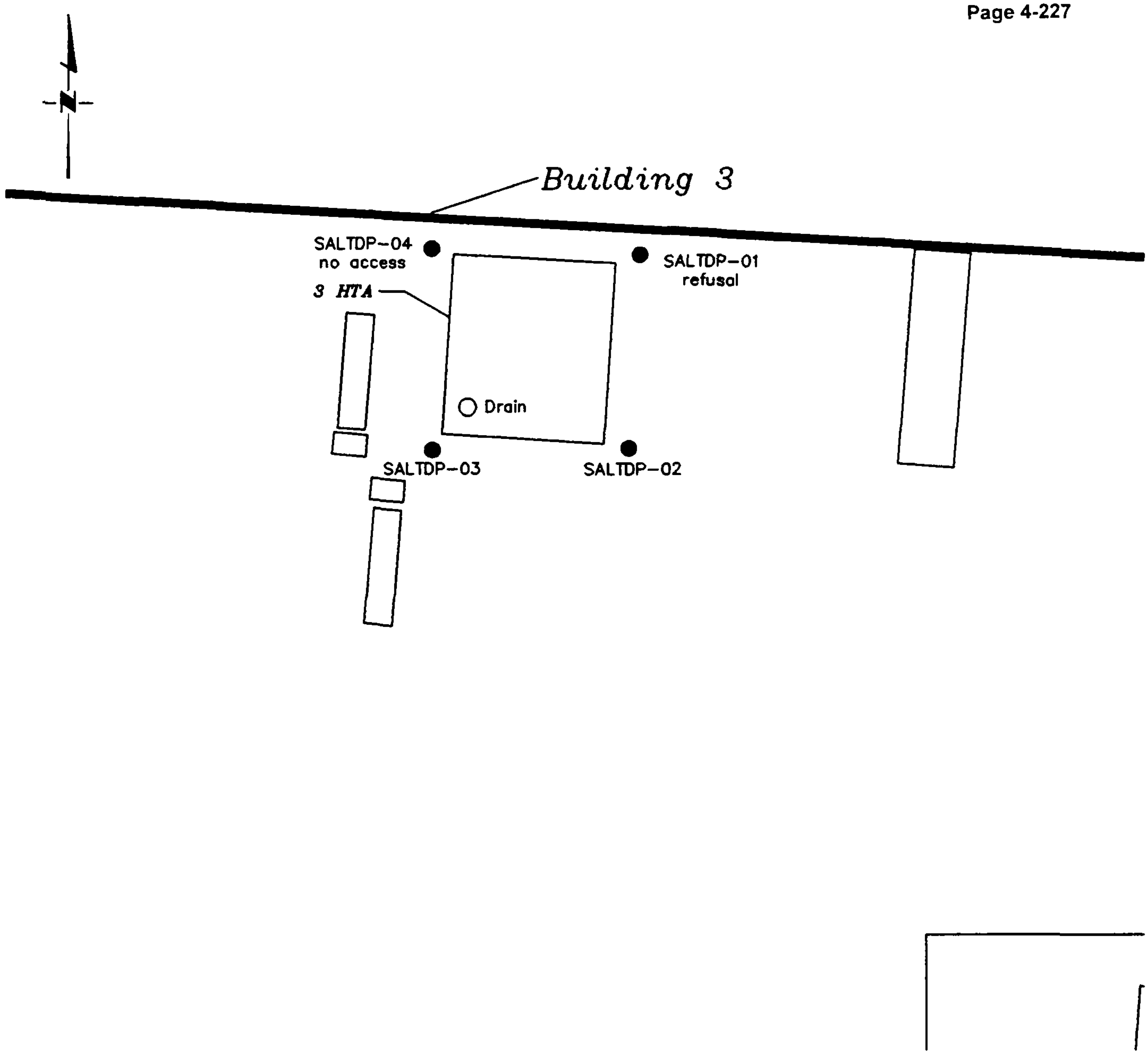
Two of four boreholes were advanced at this location; SALTDP-01 reached refusal at 1 foot bgs and SALTDP-04 was inaccessible due to wall interference. SALTDP-02 and SALTDP-03 were continuously sampled every five feet until groundwater or refusal. Two direct push soil samples were collected at Salt Bath Furnace Pit (3-HTA) and analyzed for VOCs, SVOCs, metals, GRO and DRO. Sample locations are shown in Figure 4.17-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

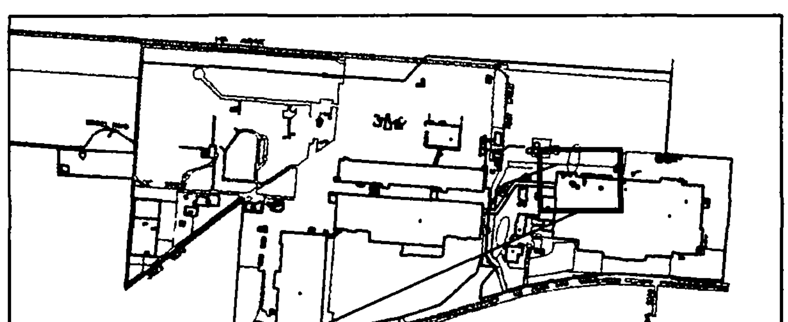
Number of Samples Collected at Salt Bath Furnace Pit (3-HTA)				
Sampling Point	**Soil(1)**	**Groundwater**	**Soil Gas**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	2	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Volatile organic compounds (SW8260), semivolatile organic compounds, diesel and gasoline range organics (modified SW8015), metals (SW3050/SW6010), and soil moisture (ASTM D2216).

4.17.3 Results

Mercury, TPH, numerous inorganics, methylene chloride, and two PAHs were detected in soil samples collected at Salt Bath Furnace Pit (3-HTA); concentrations are presented in Table 4.17-1. Table 4.17-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Two boreholes were advanced at Salt Bath Furnace Pit (3-HTA); depths were 4.6 and 7.5 feet bgs. The soils encountered were yellow brown clayey silt with few gravel. Groundwater was not encountered in any of the borings. No sample for vertical conductivity determination was collected. However, a value of 3.5×10^{-8} cm/s was reported at nearby HTA Quench Tank Pits.





Area of Interest

EARTH TECH

Figure 4.17-1

Salt Bath Furnace Pit (3-HTA) Soil Sample Locations

Legend

● Direct Push Sample Location

0' 10' 20' 40'

SCALE

29179.4.16-19.DWG/.PLT

Table 4.17-1

Summary of Analyte Concentrations for Soil Samples
Salt Bath Furnace Pit (3-HTA)

Sample ID Date Sampled Depth	SALTDP-0201N 2/8/99 3.5 - 4.5 ft bgs	SALTDP-0201D 2/8/99 3.5 - 4.5 ft bgs	SALTDP-0301N 2/8/99 3.5 - 7.5 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**		
Aluminum	12500	12300	5510
Arsenic	19 2	15 4	12
Barium	159	188	78 9
Beryllium	0 65	0 59 J	0 31 J
Cadmium	0 61 U	0 6 U	0 75
Chromium (Total)	18 4	16 6	8 5
Cobalt	11 2	10 1	9
Copper	31 5	28 1	20 8
Iron	27700	25000	15800
Lead	15 5	14 3	9 1
Manganese	719	319	305
Nickel	36 6	32 4	29 5
Thallium	1 6	1 9	1 2
Vanadium	40	33	18 6
Zinc	108 B	91.9 B	78 9 B
Analyte	**Mercury by SW7471 (mg/kg)**		
Mercury	0 053 J	0 048 J	0 037 J
Analyte	**Volatiles by SW8260 (ug/kg)**		
Methylene Chloride	300 U	67 J	270 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**		
Fluoranthene	400 U	68 J	360 U
Pyrene	400 U	62 J	360 U

Table 4.17-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Salt Bath Furnace Pit (3-HTA)

Sample ID Date Sampled Depth	SALTDP-0201N 2/8/99 3.5 - 4.5 ft bgs	SALTDP-0201D 2/8/99 3.5 - 4.5 ft bgs	SALTDP-0301N 2/8/99 3.5 - 7.5 ft bgs
Analyte	**TPH by M8015D (mg/kg)**		
PHC C10-C22	12 U	12 U	13

Note: Sample ID SALTDP-0201D is a field duplicate

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.17-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Salt Bath Furnace Pit (3-HTA)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Aluminum	1000000 00	12500
Arsenic	86 00	19 2
Barium	140000 00	188
Beryllium	30	0 65
Calcium	NA	70500
Cadmium	300 00	0 75
Cobalt	10000	11 2
Chromium (Total)	2800 00	18.4
Copper	70000	31 5
Iron	100000	27700
Potassium	NA	2440
Magnesium	NA	27700
Manganese	45000	719
Sodium	NA	177
Nickel	3700 00	36 6
Lead	2800	15 5
Thallium	160	1 9
Vanadium	14000	40
Zinc	370000 00	108
Mercury by SW7471		

Table 4.17-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Salt Bath Furnace Pit (3-HTA)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Mercury	230 00	0 053
Volatiles by SW8260		
Methylene Chloride	990 00	0 067
Semivolatiles by SW8270		
Fluoranthene	12000 00	0 068
Pyrene	9100 00	0 062
TPH by M8015D		
PHC C10-C22	20000	13

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

4.17.4 Data Validation Summary

Two soil samples and one soil duplicate were collected at 3-HTA-SALT and were analyzed for VOCs, SVOCs, TPH (GRO and DRO) and inorganics.

All soil data points are useable. The following provides a summary of data validation results for samples collected at 3-HTA-SALT:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	105	0	100%	1.9%	0%
SVOCs	192	0	100%	1.5%	0%
TPH (GRO and DRO)	6	0	100%	0%	0%
Inorganics	69	0	100%	5.2%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.17.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. The Salt Bath Furnace Pit (3-HTA) is recommended for Category 4 designation.

4.18 SANITARY SEWERS (SSEWER)

The underground sanitary sewer lines associated with Building 3, 13, and 5 connect to the City of Columbus sewage system. Prior to the installation of the IWTP in 1965, most wastewater from manufacturing processes was collected, neutralized, and discharged to the sanitary sewer system.

4.18.1 Site Summary

These sewer lines are constructed primarily of glazed clay and concrete and range from 6 to 15 inches in diameter (Reference 153). Because of their age and the fact that they carried only partially treated wastewaters for many years, the sewer lines were integrity tested and found to be of adequate quality. The Air Force has contracted for an assessment using a video camera and pressure testing. Potential contaminants include PAHs, VOCs, TPHs, Herbicides, PCBs, TCLP metals and total cyanides (Reference 204). These lines were designated Category 7 in the EBS (Reference 213).

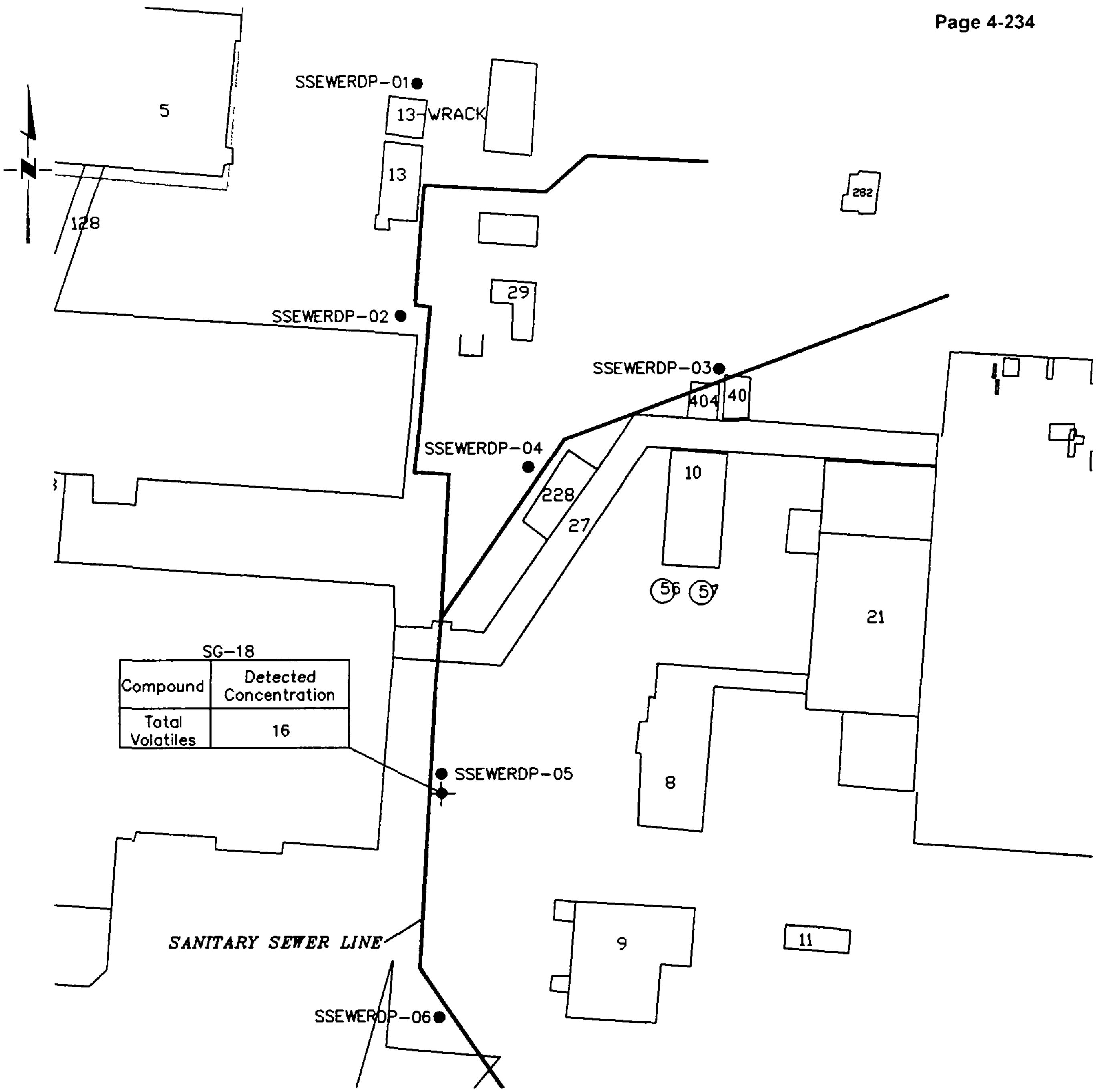
4.18.2 Field Activities Conducted

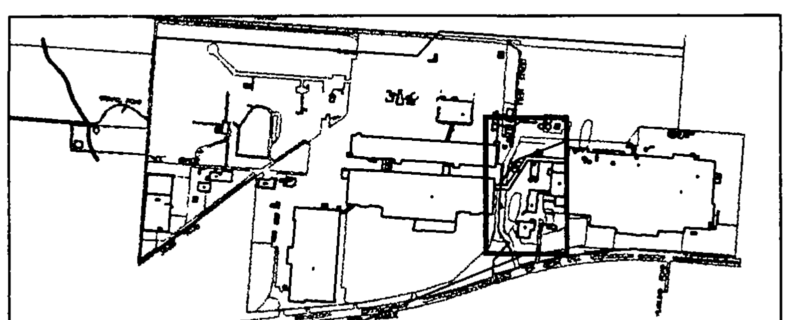
A soil gas survey was performed by collecting 40 samples along the Sanitary Sewers to locate the optimal locations for six boreholes which were drilled using direct push. Each borehole was continuously sampled every five feet until groundwater or refusal. Sixteen direct push soil samples were collected at SSEWER and analyzed for VOCs, SVOCs, PCBs, metals, GRO and DRO. Sample locations are shown in Figure 4.18-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at SSEWER				
Sampling Point	**Soil(1)**	**Groundwater**	**Soil Gas(2)**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	16	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	40	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Metals (SW3050/6010), mercury (SW7471), volatile organic compounds (SW8260), semivolatile compounds (SW3550/8270), Diesel range and gasoline range organics (modified SW8015), SVOCs (SW3550/8270), PCBs/pesticides (SW3550/8080), vertical conductivity, and soil moisture (ASTM D2216).

(2) Soil gas analytical suite: TCE, TCA, benzene, toluene, ethylbenzene, and xylenes by gas chromatography in the field.





Legend
- ● Direct Push Sample Location
- ✛ Soil Gas Sample Location

0' 100' 200' 400'
SCALE

EARTH TECH | Figure 4.18-1

Sanitary Sewers (SSEWER) Soil Gas Detection (ug/L) and Soil Sample Locations

4.18.3 Results

Methylene chloride, DRO, numerous inorganics and SVOCs were detected in soil samples collected at SSEWER; concentrations are presented in Table 4.18-1. Table 4.18-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Six boreholes were advanced at SSEWER; depths ranged from 12 to 18 feet bgs. The soils encountered varied from yellow brown clayey silt to clay, with high plasticity, gravel and little sand. One boring (SSEWERDP-05) contained gravelly sand with coarse sand and fine to medium gravel from 0 to 16 feet bgs. Groundwater was encountered between 8 and 12 feet bgs in three of the borings. No sample for vertical conductivity determination was collected. However, a value of 2.65×10^{-8} cm/s was reported at nearby PSEWER.

4.18.4 Data Validation Summary

Sixteen soil samples and four soil duplicates were collected at SSEWER and were analyzed for VOCs, SVOCs, PCBs, TPH (GRO and DRO) and inorganics.

On the basis of concentrations detected in associated blanks, methylene chloride results were qualified as non-detect for four soil samples.

On the basis of concentrations detected in associated laboratory blanks, sodium results were qualified as non-detect for five soil samples (SSEWERDP-0102N, SSEWERDP-0103N, SSEWERDP-0201N, SSEWERDP-0201D and SSEWERDP-0202N). More than 61% of the inorganic data points were estimated due to matrix interference and field duplicate precision.

All soil data points are useable. The following provides a summary of data validation results for samples collected at SSEWER:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	700	0	100%	6.7%	0.6%
SVOCs	1280	0	100%	1.8%	0%
PCBs	140	0	100%	4.3%	0%
TPH (GRO and DRO)	40	0	100%	10.0%	0%
Inorganics	460	0	100%	61.5%	1.1%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.18.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. SSEWER is recommended for Category 4 designation.

Table 4.18-1

Summary of Analyte Concentrations for Soil Samples
Sanitary Sewers (SSEWER)

Sample ID Date Sampled Depth	SSEWERDP-0101N 2/19/99 4 - 8 ft bgs	SSEWERDP-0101D 2/19/99 4 - 8 ft bgs	SSEWERDP-0102N 2/19/99 8 - 12 ft bgs	SSEWERDP-0103N 2/19/99 12 - 14 ft bgs	SSEWERDP-0201N 2/19/99 4 - 8 ft bgs	SSEWERDP-0201D 2/19/99 4 - 8 ft bgs	SSEWERDP-0202N 2/19/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	15600	7880	4670	6660	6000	9960	7290
Arsenic	10 1	15	42 4	12 9	10 4	9 8	10 1
Barium	255	75 7	94 8	43 2	90 2	105	89 3 D
Beryllium	0 65	0 32 J	0 22 J	0 29 J	0 27 J	0 39 J	0 32 J
Chromium (Total)	20 9	11 6	7 3	9 8	9 2	13	10 7 D
Cobalt	22 5	6 2	7 1	7	8	8 7	9 3 D
Copper	30 8	24 9	27 3	22 1	19 5	19 5	19 4
Iron	22800 B	21900 B	41600 B	19000 B	16700 B	17400 B	17300 D
Lead	21 1	11 5	11 5	29 1	8 9	9 2	9 1 D
Manganese	1720	210	218	344	325	429	268 D
Nickel	64 3	24 4	27 6	25 7	24 6	27 7	24 7 D
Selenium	0 63 U	0 62 U	0 56 U	0 65	0 58 U	0.57 U	0 58 U
Silver	1 3 U	1 2 U	1 1 U	1.1 U	1.2 U	1 1 U	1 2 U
Thallium	1 1 J	1 2 U	1 1 U	1 1 U	1 2 U	1 1 U	1 2 U
Vanadium	36 5	23	14 8	19 6	13 2	22 2	16 D
Zinc	96 1 B	80 6 B	85 5 B	87 2 B	56 2 B	65 3 B	70 1 D
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 052 J	0 036 J	0 032 J	0 029 J	0 037 J	0 036 J	0 037 J
Analyte	**Volatiles by SW8260 (ug/kg)**						
Methylene Chloride	290 J	82 J	85 J	92 J	74 J	52 J	83 J

Table 4.18-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Sanitary Sewers (SSEWER)

Sample ID / Date Sampled / Depth	SSEWERDP-0101N 2/19/99 4 - 8 ft bgs	SSEWERDP-0101D 2/19/99 4 - 8 ft bgs	SSEWERDP-0102N 2/19/99 8 - 12 ft bgs	SSEWERDP-0103N 2/19/99 12 - 14 ft bgs	SSEWERDP-0201N 2/19/99 4 - 8 ft bgs	SSEWERDP-0201D 2/19/99 4 - 8 ft bgs	SSEWERDP-0202N 2/19/99 8 - 12 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**						
Fluoranthene	420 U	410 U	370 U	360 U	380 U	380 U	380 U
Phenanthrene	420 U	410 U	370 U	360 U	380 U	380 U	380 U
Pyrene	420 U	410 U	370 U	360 U	380 U	380 U	380 U
Analyte	**TPH by M8015D (mg/kg)**						
PHC C10-C22	13 U	12 U	45	65	12 U	11 U	12 U

Table 4.18-1

Summary of Analyte Concentrations for Soil Samples
Sanitary Sewers (SSEWER)

Sample ID Date Sampled Depth	SSEWERDP-0301N 2/22/99 0 - 4 ft bgs	SSEWERDP-0302N 2/22/99 4 - 8 ft bgs	SSEWERDP-0303N 2/23/99 8 - 11 ft bgs	SSEWERDP-0401N 2/23/99 0 - 4 ft bgs	SSEWERDP-0401D 2/23/99 0 - 4 ft bgs	SSEWERDP-0402N 2/23/99 4 - 8 ft bgs	SSEWERDP-0403N 2/23/99 12 - 13.5 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**						
Aluminum	33400	9400	5810	5230	11400	17300	9290
Arsenic	15 1	13 6	12 4	13 5	15 7	35 4	12 3
Barium	215	85 9	71 7	93 4	140	259	70 3
Beryllium	0 81	0 32 J	0 2 J	0.16 J	0 89	0.75	0 32 J
Chromium (Total)	34 5	13	8 7	7 5	12 2	19 9	12 2
Cobalt	17 6	13	8 6	9 7	10 8	19 4	7
Copper	30 2	25 1	24 2	21 2	27 3	43	26
Iron	35300 B	21400 B	20100 B	17300 B	24100 B	42500 B	20500 B
Lead	14	11	9 9	12 3	12 4	19 8	10 2
Manganese	428	341	260	252	272	1040	180
Nickel	36 6	29 3	28 2	25.4	48.9	67 8	27.8
Selenium	0 65 U	0 58 U	2	0 65	0 66 U	0 66 U	1 1
Silver	1 3 U	0 61 J	1 1 U	1 2 U	1 3 U	1 3 U	1 1 U
Thallium	1 4	1 2 U	1 1 U	1 2 U	1 1 J	1 J	0 8 J
Vanadium	71	23 7	15 6	18 4	26 8	46	26 6
Zinc	97 7 B	78 8 B	91 2 B	81 4 B	101 B	134 B	86 9 B
Analyte	**Mercury by SW7471 (mg/kg)**						
Mercury	0 073 J	0 027 J	0 021 J	0 12 U	0.028 J	0 072 J	0 11 U
Analyte	**Volatiles by SW8260 (ug/kg)**						
Methylene Chloride	270 U	100 J	110 J	86 J	160 J	120 J	76 J

Table 4.18-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Sanitary Sewers (SSEWER)

Sample ID Date Sampled Depth	SSEWERDP-0301N 2/22/99 0 - 4 ft bgs	SSEWERDP-0302N 2/22/99 4 - 8 ft bgs	SSEWERDP-0303N 2/23/99 8 - 11 ft bgs	SSEWERDP-0401N 2/23/99 0 - 4 ft bgs	SSEWERDP-0401D 2/23/99 0 - 4 ft bgs	SSEWERDP-0402N 2/23/99 4 - 8 ft bgs	SSEWERDP-0403N 2/23/99 12 - 13.5 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**						
Fluoranthene	430 U	72 J	360 U	380 U	440 U	440 U	370 U
Phenanthrene	430 U	45 J	360 U	380 U	440 U	440 U	370 U
Pyrene	430 U	49 J	360 U	380 U	440 U	440 U	370 U
Analyte	**TPH by M8015D (mg/kg)**						
PHC C10-C22	13 U	12 U	11 U	18	13 U	13 U	26

Table 4.18-1

Summary of Analyte Concentrations for Soil Samples
Sanitary Sewers (SSEWER)

Sample ID / Date Sampled / Depth	SSEWERDP-0501N 2/23/99 0 - 4 ft bgs	SSEWERDP-0502N 2/23/99 4 - 8 ft bgs	SSEWERDP-0601N 2/23/99 0 - 4 ft bgs	SSEWERDP-0601D 2/23/99 0 - 4 ft bgs	SSEWERDP-0602N 2/23/99 4 - 8 ft bgs	SSEWERDP-0603N 2/23/99 8 - 12 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**					
Aluminum	496	567	17300	12500	15600	14500
Arsenic	0 99 J	1 2	15 5	11.7	10 1	10 7
Barium	11 1 J	12 J	130	133	156	287
Beryllium	0 54 U	0 55 U	0 63	0 55 J	0 62 J	0 35 J
Chromium (Total)	3 9	4 9	18 9	15	18 1	17 2
Cobalt	5 4 U	5 5 U	8 5	9 4	11	16 3
Copper	2 J	1 6 J	26 4	25 3	21 8	19 1
Iron	1260 B	1180 B	24700 B	19400 B	21600 B	24300 B
Lead	0 81	0 39	17 2	16	17 1	17 3
Manganese	74 6	73 2	333	344	537	821
Nickel	4 8	4 6	30	29 6	39 8	33 1
Selenium	0 54 U	0 55 U	0 61 U	0 61 U	0 62 U	0 61 U
Silver	1 1 U	1 1 U	1 2 U	1 2 U	1 2 U	1 2 U
Thallium	1.1 U	1.1 U	0 79 J	0 94 J	1 2 U	0 86 J
Vanadium	3 5 J	4 J	44 6	32 1	36 3	29
Zinc	15 2 B	18 2 B	108 B	98 7 B	107 B	96 3 B
Analyte	**Mercury by SW7471 (mg/kg)**					
Mercury	0 11 U	0 11 U	0 025 J	0 046 J	0 054 J	0 033 J
Analyte	**Volatiles by SW8260 (ug/kg)**					
Methylene Chloride	210 U	210 U	250 U	250 U	260 U	250 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
Fluoranthene	360 U	360 U	400 U	400 U	410 U	400 U

Table 4.18-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Sanitary Sewers (SSEWER)

Sample ID Date Sampled Depth	SSEWERDP-0501N 2/23/99 0 - 4 ft bgs	SSEWERDP-0502N 2/23/99 4 - 8 ft bgs	SSEWERDP-0601N 2/23/99 0 - 4 ft bgs	SSEWERDP-0601D 2/23/99 0 - 4 ft bgs	SSEWERDP-0602N 2/23/99 4 - 8 ft bgs	SSEWERDP-0603N 2/23/99 8 - 12 ft bgs
Phenanthrene	360 U	360 U	400 U	400 U	410 U	400 U
Pyrene	360 U	360 U	400 U	400 U	410 U	400 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC C10-C22	12	11 U	17	12 U	12 U	12 U

Note: Sample IDs SSEWERDP-0101D, SSEWERDP-0201D, SSEWERDP-0401D and SSEWERDP-0601D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.18-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Sanitary Sewers (SSEWER)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Silver	10000 00	0 61
Aluminum	1000000 00	33400
Arsenic	86 00	42 4
Barium	140000 00	287
Beryllium	30	0 89
Calcium	NA	216000
Cobalt	10000	22 5
Chromium (Total)	2800 00	34 5
Copper	70000	43
Iron	100000	42500
Potassium	NA	3090
Magnesium	NA	87900
Manganese	45000	1720
Sodium	NA	318
Nickel	3700 00	67 8
Lead	2800	29 1
Selenium	10000 00	2
Thallium	160	1 4
Vanadium	14000	71
Zinc	370000 00	134

Table 4.18-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Sanitary Sewers (SSEWER)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
Mercury by SW7471		
Mercury	230 00	0 073
Volatiles by SW8260		
Methylene Chloride	990 00	0 29
Semivolatiles by SW8270		
Fluoranthene	12000 00	0 072
Phenanthrene	91000 00	0.045
Pyrene	9100 00	0 049
TPH by M8015D		
PHC C10-C22	20000	65

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

4.19 SEPTIC TANKS (SPTANK3, SPTANK4)

Abandoned septic tanks and filter beds/leach fields were identified at five separate locations at AFP 85. There are five septic tanks and associated filter beds/leachfields located in the western section of plant property. SPTANK3 and SPTANK4 are located west of Building 245.

4.19.1 Site Summary

The tanks were identified by O'Brien and Gere in their draft EBS report (Reference 153). The septic systems are suspected to have received sanitary and other liquid wastes from buildings to which they were connected. All are believed to be out of service. SPTANKS 3 and 4 require additional evaluation and were designated as Category 7 in the EBS.

4.19.2 Field Activities Conducted

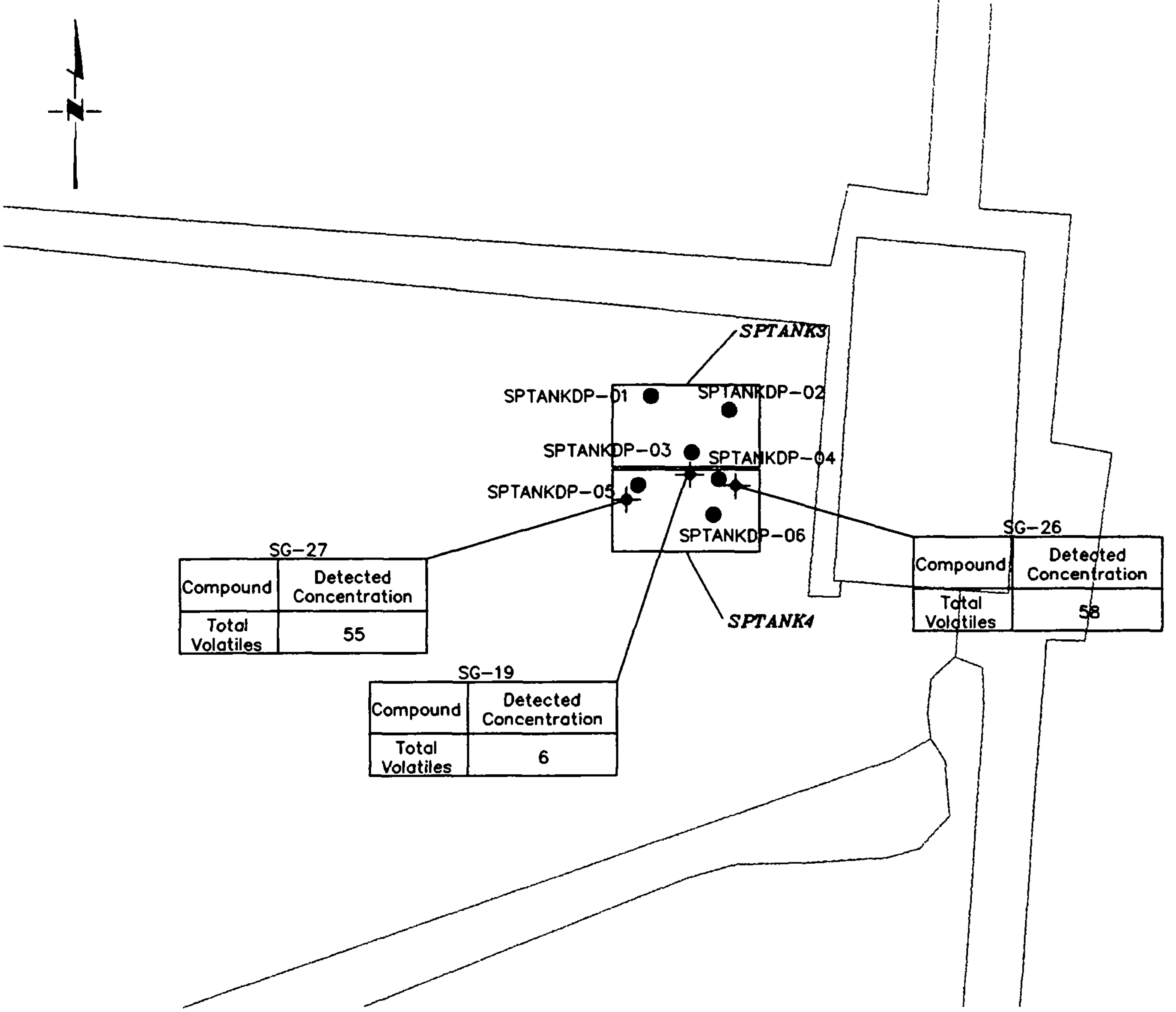
A soil gas survey was performed by collecting 41 samples in the Septic Tank 3 and Septic Tank 4 area to locate the optimal locations for six boreholes which were drilled using direct push. Each borehole was continuously sampled every five feet until groundwater or refusal. Thirteen direct push soil samples and two groundwater sample were collected at SPTANK3/SPTANK4 and analyzed for VOCs, SVOCs, metals, GRO and DRO. Samples were also analyzed for mercury. Sample locations are shown in Figure 4.19-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

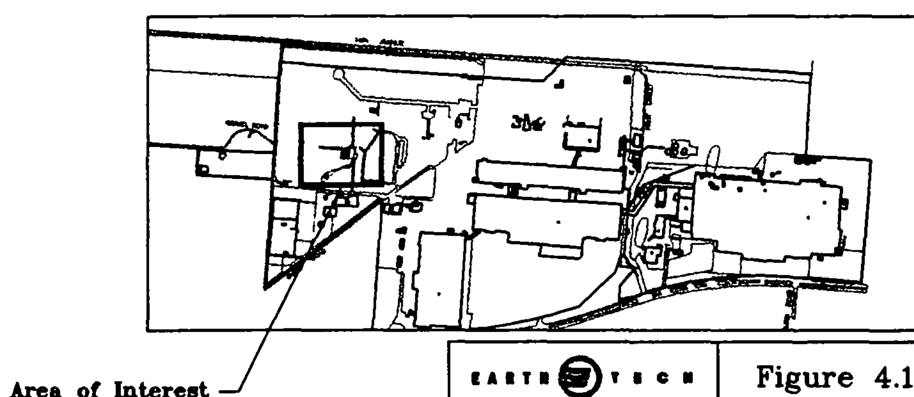
Number of Samples Collected at SPTANK3/SPTANK4				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas(3)	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	13	2	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	41	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Metals (SW3050/6010), mercury (SW7471), volatile organic compounds (SW8260), semivolatile compounds (SW3550/8270), Diesel range and gasoline range organics (modified SW8015), vertical conductivity, and soil moisture (ASTM D2216).

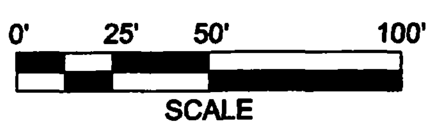
(2) Groundwater analytical suite: Metals (filtered and unfiltered) (SW3005/6010), mercury (SW7470), volatile organic compounds (SW8260), semivolatile compounds (SW3510/8270), Diesel range and gasoline range organics (modified SW8015).

(3) Soil gas analytical suite: TCE, TCA, TPH (SW5030/SW8020), benzene, toluene, ethylbenzene, and xylenes by gas chromatography in the field.





Legend
● Direct Push Sample Location



EARTH TECH

Figure 4.19-1

Septic Tanks
SPTANK3/SPTANK4
Soil Gas Detection (ug/L)
and Sample Locations

29179 4 16-19.DWG/.PLT

4.19.3 Results

Numerous inorganics, SVOCs, TPH, and VOCs were detected in soil samples collected at SPTANK3/SPTANK4; concentrations are presented in Table 4.19-1. Table 4.19-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Figure 4.19-1 shows the location where soil samples were collected. Six boreholes were advanced at SPTANKS 3 and 4; depths ranged from 8 to 12 feet bgs. The soils encountered varied from orange brown to yellow brown silty clay with gravel and trace sand. Groundwater was encountered between 5 and 9 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 2.91×10^{-8} cm/s was reported at nearby IRP Site 4 during the Phase II-Fall 98 investigation.

TPH and inorganics were detected in groundwater samples collected at SPTANK3 / SPTANK4; concentrations are presented in Table 4.19-3. There were no detected concentrations that exceeded the respective VAP standard. Figure 4.19-2 shows the location where samples were collected.

4.19.4 Data Validation Summary

Six soil samples, three soil duplicates and two groundwater samples were collected at SPTANK 3 and 4 and were analyzed for VOCs, SVOCs, TPH (GRO and DRO) and inorganics.

Naphthalene and hexachlorobutadiene were qualified as non detect in sample SPTANKDP-0601N as a result of blank contamination.

More than 72% of the TPH (GRO and DRO) data points for soil samples were estimated due to low percent recovery of matrix and surrogate spikes.

Non-detect results for selenium were qualified R and rejected for nine soil samples due to low percent recovery of matrix spikes and a high RPD between matrix spike and matrix spike duplicate results. More than 47% of the soil inorganic data points were estimated due to matrix interference and field duplicate precision.

All groundwater data points are useable. All soil samples are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at SPTANK 3 and 4:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
VOCs	612	0	100%	6.9%	0.3%
SVOCs	594	0	100%	1.5%	0%
TPH (GRO and DRO)	18	0	100%	72.2%	0%
Inorganics	198	9	95.5%	47.0%	0%

Table 4.19-1

Summary of Analyte Concentrations for Soil Samples
Septic Tanks (SPTANK3/SPTANK4)

Sample ID Date Sampled Depth	SPTANKDP-0101N 2/22/99 4 - 8 ft bgs	SPTANKDP-0101D 2/22/99 4 - 8 ft bgs	SPTANKDP-0201N 2/22/99 4 - 8 ft bgs	SPTANKDP-0301N 2/22/99 4 - 8 ft bgs	SPTANKDP-0301D 2/22/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**				
Aluminum	15000	9800	9800	13000	12000
Arsenic	57	33	41	39	44
Barium	100	110	130	90	100
Beryllium	0 91	0 6	0 61	0 82	0 77
Cadmium	0 61 U	0 92	1 3	0 61 U	0 73
Chromium (Total)	20	13	12	18	16
Cobalt	16	14	12	14	18
Copper	40	31	30	38	38
Iron	49000	31000	34000	49000	40000
Lead	27	17	15	15	14
Manganese	310	540	660	290	490
Nickel	44	44	42	42	43
Thallium	0 83 S	1 4 S	2 S	0 92 S	0 94 S
Vanadium	45	29	29	38	35
Zinc	130	100	140	150	130
Analyte	**Volatiles by SW8260 (ug/kg)**				
1,2,3-Trichlorobenzene	490 U	500 U	470 U	520 U	490 U
1,2,4-Trichlorobenzene	490 U	500 U	470 U	520 U	490 U
Acetone	460	440	440	530	530
Bromomethane	980 U	1000 U	930 U	1000 U	75
Chlorobenzene	490 U	500 U	470 U	520 U	490 U
Hexachlorobutadiene	490 U	500 U	470 U	520 U	490 U

Table 4.19-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Septic Tanks (SPTANK3/SPTANK4)

Sample ID Date Sampled Depth	SPTANKDP-0101N 2/22/99 4 - 8 ft bgs	SPTANKDP-0101D 2/22/99 4 - 8 ft bgs	SPTANKDP-0201N 2/22/99 4 - 8 ft bgs	SPTANKDP-0301N 2/22/99 4 - 8 ft bgs	SPTANKDP-0301D 2/22/99 4 - 8 ft bgs
m-Xylene	14	500 U	13	520 U	15
Methyl Ethyl Ketone	730	710	720	870	850
Methylene Chloride	29	500 U	27	520 U	28
Naphthalene	980 U	1000 U	930 U	1000 U	990 U
Toluene	490 U	500 U	470 U	520 U	490 U
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
1,2,4-Trichlorobenzene	200 U	190 U	190 U	200 U	190 U
Hexachlorobutadiene	200 U	190 U	190 U	200 U	190 U
Naphthalene	200 U	190 U	190 U	200 U	190 U
Analyte	**TPH by M8015D (ug/kg)**				
PHC C16-C32	6700 J	8600 J	12000	9200 J	5500 J

Table 4.19-1

Summary of Analyte Concentrations for Soil Samples
Septic Tanks (SPTANK3/SPTANK4)

Sample ID Date Sampled Depth	SPTANKDP-0401N 2/22/99 4 - 8 ft bgs	SPTANKDP-0401D 2/22/99 4 - 8 ft bgs	SPTANKDP-0501N 2/22/99 4 - 8 ft bgs	SPTANKDP-0601N 2/22/99 4 - 8 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Aluminum	13000	16000	19000	3700
Arsenic	24	29	7 8	19
Barium	92	110	170	41
Beryllium	0 72	0 86	0 95	0 56 U
Cadmium	0 62 U	0 58 U	0 62 U	0 56 U
Chromium (Total)	18	20	24	4 9
Cobalt	14	8 9	20	3 7
Copper	32	33	38	11
Iron	37000	41000	45000	9200
Lead	56	11	11	7
Manganese	360	110	820	180
Nickel	36	32	37	9 2
Thallium	1 S	0 81 S	0 38 U	0 59 S
Vanadium	33	44	36	10
Zinc	150	130	97	32
Analyte	**Volatiles by SW8260 (ug/kg)**			
1,2,3-Trichlorobenzene	490 U	550 U	560 U	530 U
1,2,4-Trichlorobenzene	490 U	550 U	560 U	530 U
Acetone	520	480	520	580
Bromomethane	990 U	51	69	1100 U
Chlorobenzene	490 U	550 U	560 U	530 U
Hexachlorobutadiene	490 U	550 U	560 U	70
m-Xylene	490 U	550 U	560 U	530 U

Table 4.19-1

Summary of Analyte Concentrations for Soil Samples (Continued)
Septic Tanks (SPTANK3/SPTANK4)

Sample ID Date Sampled Depth	SPTANKDP-0401N 2/22/99 4 - 8 ft bgs	SPTANKDP-0401D 2/22/99 4 - 8 ft bgs	SPTANKDP-0501N 2/22/99 4 - 8 ft bgs	SPTANKDP-0601N 2/22/99 4 - 8 ft bgs
Methyl Ethyl Ketone	840	790	820	680
Methylene Chloride	26	550 U	28	50
Naphthalene	990 U	1100 U	1100 U	30
Toluene	490 U	550 U	560 U	16
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
1,2,4-Trichlorobenzene	200 U	190 U	200 U	190 U
Hexachlorobutadiene	200 U	190 U	200 U	190 U
Naphthalene	200 U	190 U	200 U	190 U
Analyte	**TPH by M8015D (ug/kg)**			
PHC C16-C32	7200 J	8200 J	5400 J	8900 J

Note: Sample IDs SPTANK-0101D, SPTANK-0301D and SPTANK-0401D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.19-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Septic Tanks (SPTANK3/SPTANK4)		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
Inorganics by SW6010		
Alumınum	1000000 00	19000
Arsenıc	86 00	57
Barıum	140000 00	170
Beryllıum	30	0 95
Calcıum	NA	200000
Cadmıum	300 00	1 3
Cobalt	10000	20
Chromıum (Total)	2800 00	24
Copper	70000	40
Iron	100000	49000
Potassıum	NA	2700
Magnesıum	NA	46000
Manganese	45000	820
Sodıum	NA	120
Nıckel	3700 00	44
Lead	2800	56
Thallıum	160	2
Vanadıum	14000	45
Zınc	370000 00	150
Volatiles by SW8260		

Table 4.19-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
Septic Tanks (SPTANK3/SPTANK4)

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Acetone	55000 00	0 58
Bromomethane	NA	0 075
Toluene	520 00	0 016
Hexachlorobutadiene	38	0 07
Methyl Ethyl Ketone	27000 00	0 87
Methylene Chloride	990 00	0 05
Naphthalene	22000 00	0 03
1,2,3-Trichlorobenzene	NA	0 018
1,2,4-Trichlorobenzene	NA	0 016
m-Xylene	NA	0 015
TPH by M8015D		
PHC C16-C32	40000	12

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Table 4.19-3

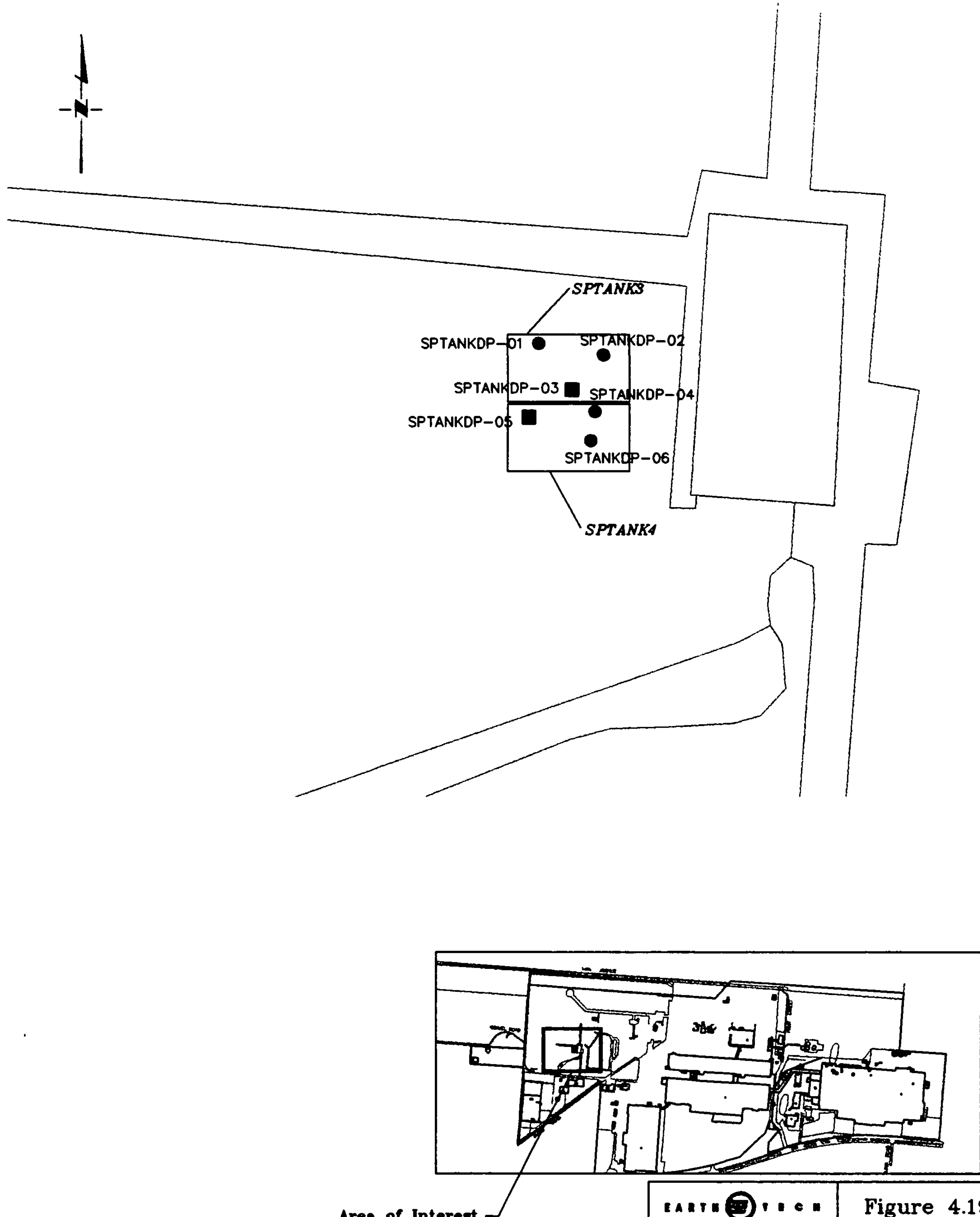
Summary of Analyte Concentrations for Groundwater Samples
Septic Tanks (SPTANK3/SPTANK4)

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	SPTANKGW-03N 2/22/99	SPTANKGW-05N 2/22/99
Analyte	**Inorganics (Total) by SW6010 (ug/L)**		
Aluminum	NA	2800	3700
Arsenic	NA	4 U	4 1
Barium	2000	130	110
Iron	NA	7100	11000
Lead	NA	5 2	5 1
Manganese	NA	660	330
Zinc	4700	38	52
Analyte	**Volatiles by SW8260 (ug/L)**		
Chlorobenzene	NA	5 U	5 U
Analyte	**TPH by M8015 (ug/L)**		
PHC C16-C32	NA	160 J	600 U

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J = Estimated
NA = Not available
U = Not detected
ug/L = Micrograms per Liter



Legend
- ● Direct Push Sample Location
- ■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.19-2

Septic Tanks
SPTANK3/SPTANK4
Groundwater Sample Locations

29179.4.16-19.DWG/.PLT

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Groundwater					
VOCs	136	0	100%	1.5%	0%
SVOCs	132	0	100%	0%	0%
TPH (GRO and DRO)	4	0	100%	25%	0%
Inorganics	44	0	100%	4.5%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.19.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. Septic Tanks (SPTANK3/SPTANK4) is recommended for Category 4 designation.

4.20 UST 3-102

UST No. 102 (3-102) was formerly located on the north side of Building 3. Constructed of steel, the tank had a capacity of 1,000 gallons and was used to store fuel oil. The UST was removed in June 1993 (Reference 244). However, the submittal of a closure letter is not required because this tank is not a regulated UST (Reference 43).

4.20.1 Site Summary

Because there is no record of closure, the UST site requires further investigation and sampling for fuel oil constituents.

4.20.2 Field Activities Conducted

Three boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Six direct push soil samples and one groundwater sample were collected at UST 3-102 and analyzed for SVOCs, GRO and DRO. Sample locations are shown in Figure 4.20-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

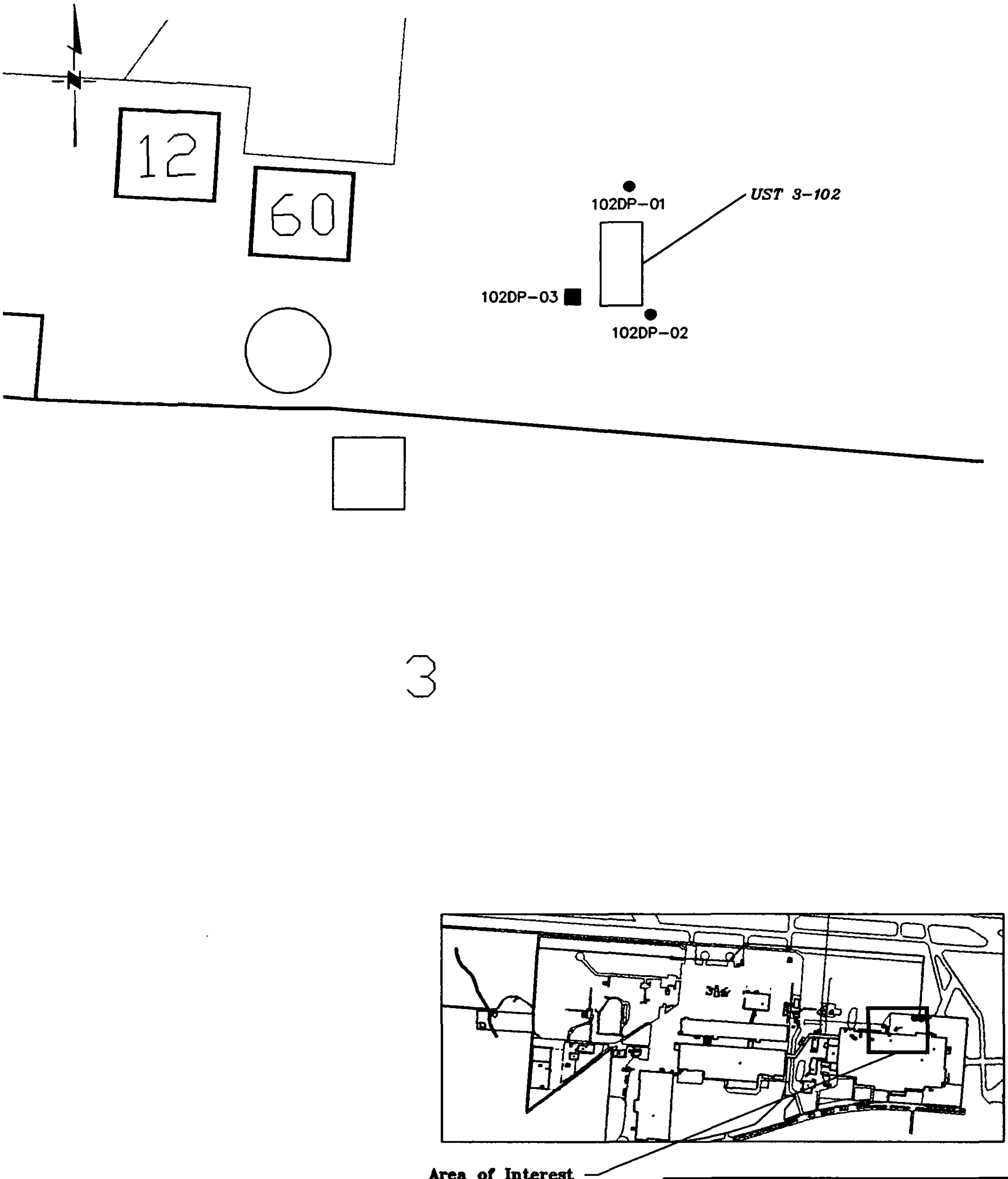
Number of Samples Collected at UST 3-102				
Sampling Point	**Soil(1)**	**Groundwater(2)**	**Soil Gas**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	6	1	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range and gasoline range organics (modified SW8015), vertical conductivity, and soil moisture (ASTM D2216), SVOCs (SW3550/8270).

(2) Groundwater analytical suite: Diesel range and gasoline range organics (modified SW8015) and SVOCs (SW3510/8270).

4.20.3 Results

TPH was detected in all six soil samples collected at UST 3-102; concentrations are presented in Table 4.20-1. Table 4.20-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Three boreholes were advanced at UST 3-102; depths ranged from 12 to 16 feet bgs. The soils encountered were yellow brown silty clay with some gravel and trace sand. Groundwater was encountered between 10 and 13 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 3.11×10^{-6} cm/s was reported at nearby 3-DPSHOP during the Phase II-Fall 98 investigation.



EARTH TECH

Figure 4.20-1

UST 3-102
Soil and Groundwater
Sample Locations

Legend
- ● Direct Push Sample Location
- ■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

Table 4.20-1

Summary of Analyte Concentrations for Soil Samples
UST 3-102

Sample ID Date Sampled Depth	102DP-0101N 2/16/99 4 - 8 ft bgs	102DP-0101D 2/16/99 4 - 8 ft bgs	102DP-0102N 2/16/99 8 - 10 ft bgs	102DP-0201N 2/16/99 4 - 8 ft bgs	102DP-0202N 2/16/99 8 - 10 ft bgs	102DP-0202D 2/16/99 8 - 10 ft bgs	102DP-0301N 2/16/99 4 - 8 ft bgs	102DP-0302N 2/16/99 8 - 12 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**							
Benzo(a)anthracene	210 U	44 J	190 U	240 U	200 U	190 U	200 U	190 U
Benzo(a)pyrene	210 U	40 J	190 U	240 U	200 U	190 U	200 U	190 U
Benzo(b)fluoranthene	210 U	34 J	190 U	240 U	200 U	190 U	200 U	190 U
Chrysene	210 U	56 J	190 U	240 U	200 U	190 U	200 U	190 U
Fluoranthene	210 U	86 J	190 U	240 U	200 U	190 U	200 U	190 U
Pyrene	210 U	61 J	190 U	240 U	200 U	190 U	200 U	190 U
Analyte	**TPH by M8015D (ug/kg)**							
PHC C16-C32	9600	8700	9200	7900	11000	8200	6100	22000

Note: Sample IDs 102DP-0101D and 102DP-0202D are field duplicates

Key:

bgs = Below ground surface
J = Estimated
U = Not detected
ug/kg = Micrograms per kilogram

Table 4.20-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
UST 3-102

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
Benzo(a)anthracene	31 00	0 044
Benzo(a)pyrene	3 10	0 04
Benzo(b)fluoranthene	31 00	0 034
Chrysene	3100 00	0 056
Fluoranthene	12000 00	0 086
Pyrene	9100 00	0 061
TPH by M8015D		
PHC C16-C32	40000	22

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Bis(2-ethylhexyl)phthalate and TPH were detected in the groundwater sample collected at UST 3-102; concentrations are presented in Table 4.20-3. There were no detected concentrations that exceeded the VAP generic unrestricted potable use standard.

4.20.4 Data Validation Summary

Six soil samples, two soil duplicates and one groundwater sample were collected at UST 3-102 and were analyzed for SVOCs and TPH (GRO and DRO).

Non-detect results for 3,3'-dichlorobenzidine were qualified R and rejected for eight soil samples due to low percent recovery laboratory control samples.

More than 68% of the TPH (GRO and DRO) data points for soil samples and 50% for the groundwater sample were estimated due to low percent recovery of matrix and surrogate spikes.

All groundwater data points are useable. All soil samples are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at UST 3-102:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	528	8	98.5%	6.2%	0%
TPH (GRO and DRO)	16	0	100%	68.8%	0%
Groundwater					
SVOCs	66	0	100%	1.5%	0%
TPH (GRO and DRO)	2	0	100%	50%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.20.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. UST 3-102 is recommended for Category 4 designation.

Table 4.20-3

Summary of Analyte Concentrations for Groundwater Samples
UST 3-102

Sample ID / Date Sampled	VAP Generic Unrestricted Potable Use Standard	102GW-03N 2/16/99
Analyte	**Semivolatiles by SW8270 (ug/L)**	
bis(2-Ethylhexyl)phthalate	NA	2 5 J
Analyte	**TPH by M8015 (ug/L)**	
PHC as Gasoline	NA	13 J

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter

4.21 UST 3-105

UST No. 105 (3-105) was formerly located near Building 3. The UST was installed in 1941.

4.21.1 Site Summary

UST 3-105 was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 15,000 gallons and was used to store No. 2 fuel oil. Samples from the excavation site contained the following contaminants at concentrations that exceeded detection limits: benzene, toluene, ethylbenzene, xylene (BTEX) (Reference 138). Because of recorded releases, the UST site required further investigation and sampling for fuel oil constituents.

4.21.2 Field Activities Conducted

Five boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Six direct push soil samples and three groundwater sample were collected at UST 3-105 and analyzed for SVOCs, GRO and DRO. Sample locations are shown in Figure 4.21-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

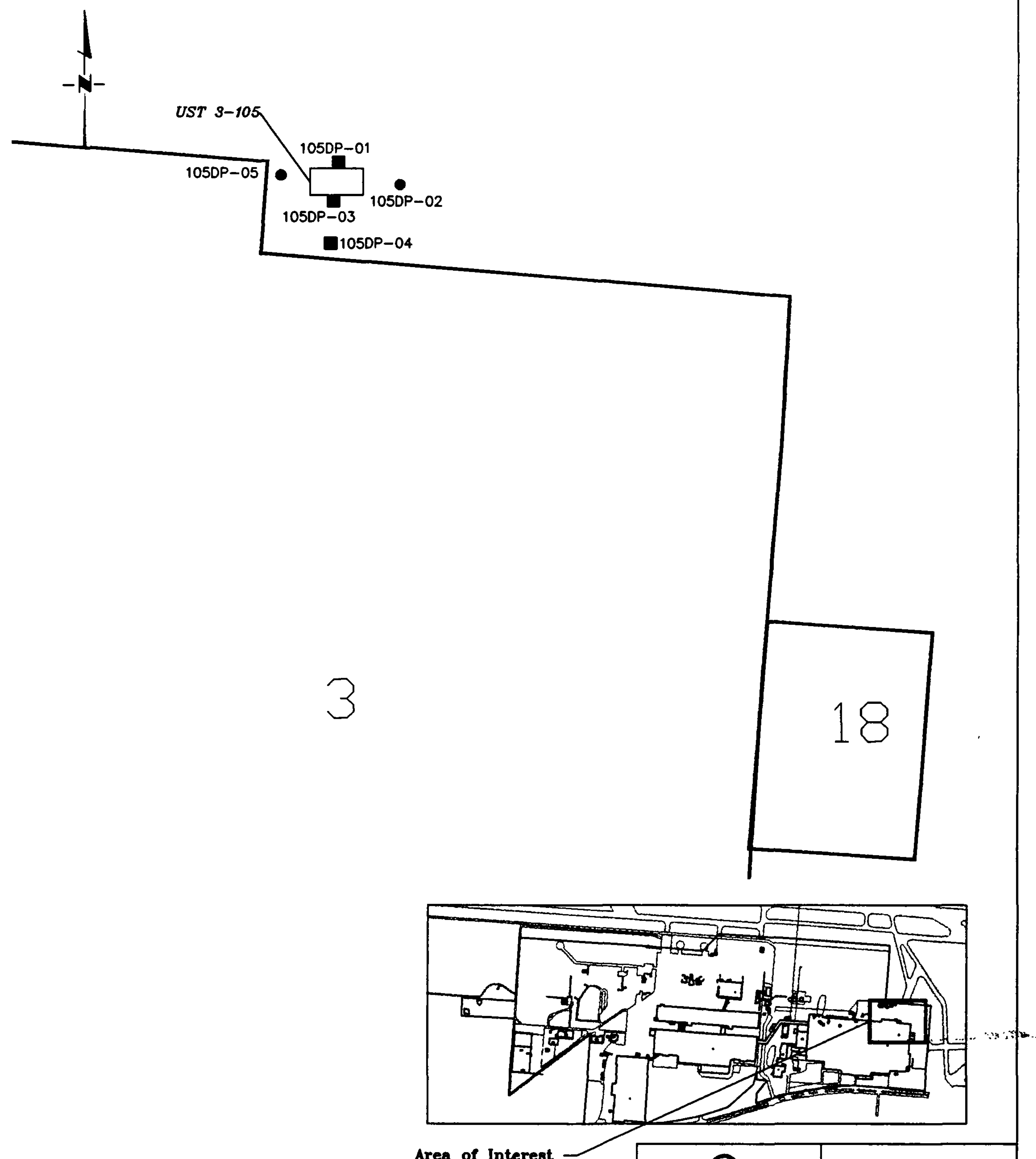
Number of Samples Collected at UST 3-105				
Sampling Point	**Soil(1)**	**Groundwater(2)**	**Soil Gas**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	6	3	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range organics and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), SVOCs (SW3550/8270), and vertical conductivity.

(2) Groundwater analytical suite: Diesel range and gasoline range organics (modified SW8015), and SVOCs (SW3510/8270).

4.21.3 Results

TPH and numerous SVOCs were detected in soil samples collected at UST 3-105; concentrations are presented in Table 4.21-1. Table 4.21-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Figure 4.21-1 shows the location where soil samples were collected. Five boreholes were advanced at UST 3-105; depths ranged from 8 to 12 feet bgs. The soils encountered varied from yellow brown silty clay to clay, with little gravel. Groundwater was encountered because 6 and 10 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 3.11×10^{-6} cm/s was reported at nearby 3-DPSHOP during the Phase II-Fall 98 investigation.



Legend
● Direct Push Sample Location
■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.21-1

UST 3-105
Soil and Groundwater
Sample Locations

29179.4.20-25.DWG/PLT

Table 4.21-1

Summary of Analyte Concentrations for Soil Samples
UST 3-105

Sample ID Date Sampled Depth	105DP-0101N 2/17/99 4 - 8 ft bgs	105DP-0101D 2/17/99 4 - 8 ft bgs	105DP-0201N 2/17/99 4 - 8 ft bgs	105DP-0301N 2/17/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
Benzo(a)anthracene	820	180 U	220	190 U
Benzo(a)pyrene	760	180 U	200 U	190 U
Benzo(b)fluoranthene	930	180 U	200 U	190 U
Benzo(g,h,i)perylene	560	180 U	200 U	190 U
Benzo(k)fluoranthene	740	180 U	200 U	190 U
Chrysene	1600	180 U	330	190 U
Fluoranthene	2800	180 U	410	190 U
Indeno(1,2,3-c,d)pyrene	520	180 U	200 U	190 U
Naphthalene	180 U	180 U	200 U	370
Phenanthrene	1400	260	200 U	190 U
Pyrene	2700	210	320	190 U
Analyte	**TPH by M8015D (ug/kg)**			
PHC as Gasoline	3000000	4400	210	83000
PHC C16-C32	390000	780000	130000	1200000

Table 4.21-1

Summary of Analyte Concentrations for Soil Samples
UST 3-105

Sample ID / Date Sampled / Depth	105DP-0401N 2/17/99 4 - 8 ft bgs	105DP-0401D 2/17/99 4 - 8 ft bgs	105DP-0501N 2/17/99 0 - 4 ft bgs	105DP-0502N 2/17/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
Benzo(a)anthracene	210 U	190 U	190 U	190 U
Benzo(a)pyrene	210 U	190 U	190 U	190 U
Benzo(b)fluoranthene	210 U	190 U	190 U	190 U
Benzo(g,h,i)perylene	210 U	190 U	190 U	190 U
Benzo(k)fluoranthene	210 U	190 U	190 U	190 U
Chrysene	210 U	190 U	190 U	190 U
Fluoranthene	210 U	190 U	190 U	190 U
Indeno(1,2,3-c,d)pyrene	210 U	190 U	190 U	190 U
Naphthalene	210 U	190 U	190 U	190 U
Phenanthrene	210 U	190 U	190 U	190 U
Pyrene	210 U	190 U	190 U	200
Analyte	**TPH by M8015D (ug/kg)**			
PHC as Gasoline	1900	3500	280000	2300000
PHC C16-C32	51000	17000	150000	1500000

Note: Sample IDs 105DP-0101D and 105DP-0401D are field duplicates

Key:

bgs	=	Below ground surface
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.21-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
UST 3-105

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
Benzo(a)anthracene	31 00	0 82
Benzo(a)pyrene	3 10	0 76
Benzo(b)fluoranthene	31 00	0 93
Benzo(g,h,i)perylene	9100 00	0 56
Benzo(k)fluoranthene	310 00	0 74
Chrysene	3100 00	1 6
Fluoranthene	12000 00	2 8
Indeno(1,2,3-c,d)pyrene	31 00	0 52
Naphthalene	22000 00	0 37
Phenanthrene	91000 00	1 4
Pyrene	9100 00	2 7
TPH by M8015D		
PHC C16-C32	40000	1500
PHC as Gasoline	8000	3000

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Numerous SVOCs and TPH were detected in the groundwater samples collected at UST 3-105; concentrations are presented in Table 4.21-3. There were no detected concentrations that exceeded the respective VAP standard.

4.21.4 Data Validation Summary

Six soil samples, two soil duplicates and three groundwater samples were collected at UST 3-105 and were analyzed for SVOCs and TPH (GRO and DRO).

The non-detect result for benzoic acid for one soil sample (105DP-0301N) and the result for hexachlorocyclopentadienedue for the soil sample 105DP-0502N were qualified R and rejected due to low percent recovery of matrix spikes and a high RPD between matrix spike and matrix spike duplicate results.

More than 56% of the TPH (GRO and DRO) data points for soil samples were estimated due to low percent recovery of matrix and surrogate spikes.

All groundwater data points are useable. All soil samples are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at UST 3-105:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	528	2	99.6%	9.9%	0%
TPH (GRO and DRO)	16	0	100%	56.3%	0%
Groundwater					
SVOCs	198	0	100%	8.6%	0%
TPH (GRO and DRO)	6	0	100%	16.7%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.21.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. UST 3-105 is recommended for Category 4 designation.

Table 4.21-3

Summary of Analyte Concentrations for Groundwater Samples
UST 3-105

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	105GW-01N 2/17/99	105GW-03N 2/17/99	105GW-04N 2/17/99
Analyte	**Semivolatiles by SW8270 (ug/L)**			
2-Methylnaphthalene	NA	19 J	6 J	10 U
Benzo(a)anthracene	NA	3 2 J	1 5 J	10 U
Benzo(b)fluoranthene	NA	3 2 J	1 4 J	10 U
bis(2-Ethylhexyl)phthalate	NA	13 J	250	2 1 J
Chrysene	NA	5 4 J	2 3 J	10 U
Fluoranthene	NA	7 5 J	3 9 J	10 U
Fluorene	NA	2 7 J	11 U	10 U
Phenanthrene	NA	5 6 J	4 3 J	10 U
Pyrene	NA	6 6 J	3 7 J	10 U
Analyte	**TPH by M8015 (ug/L)**			
PHC as Gasoline	NA	6100	23000	720
PHC C16-C32	NA	3900	35000	2200

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J = Estimated
NA = Not available.
U = Not detected
ug/L = Micrograms per Liter

4.22 UST 7-290

UST No. 290 (7-290) was formerly located southeast of Building 270. The UST was installed in 1955.

4.22.1 Site Summary

UST 7-290 was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 5,000 gallons and was used to store No. 2 fuel oil. Samples from the south wall of the excavation pit contained oil and grease at concentrations that exceeded detection limits (Reference 138). Because of recorded releases, the UST site requires further investigation and sampling for fuel oil constituents.

4.22.2 Field Activities Conducted

Four boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Seven direct push soil samples and two groundwater samples were collected at UST 7-290 and analyzed for SVOCs, GRO and DRO. A sample for vertical conductivity determination was collected. Sample locations are shown in Figure 4.22-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

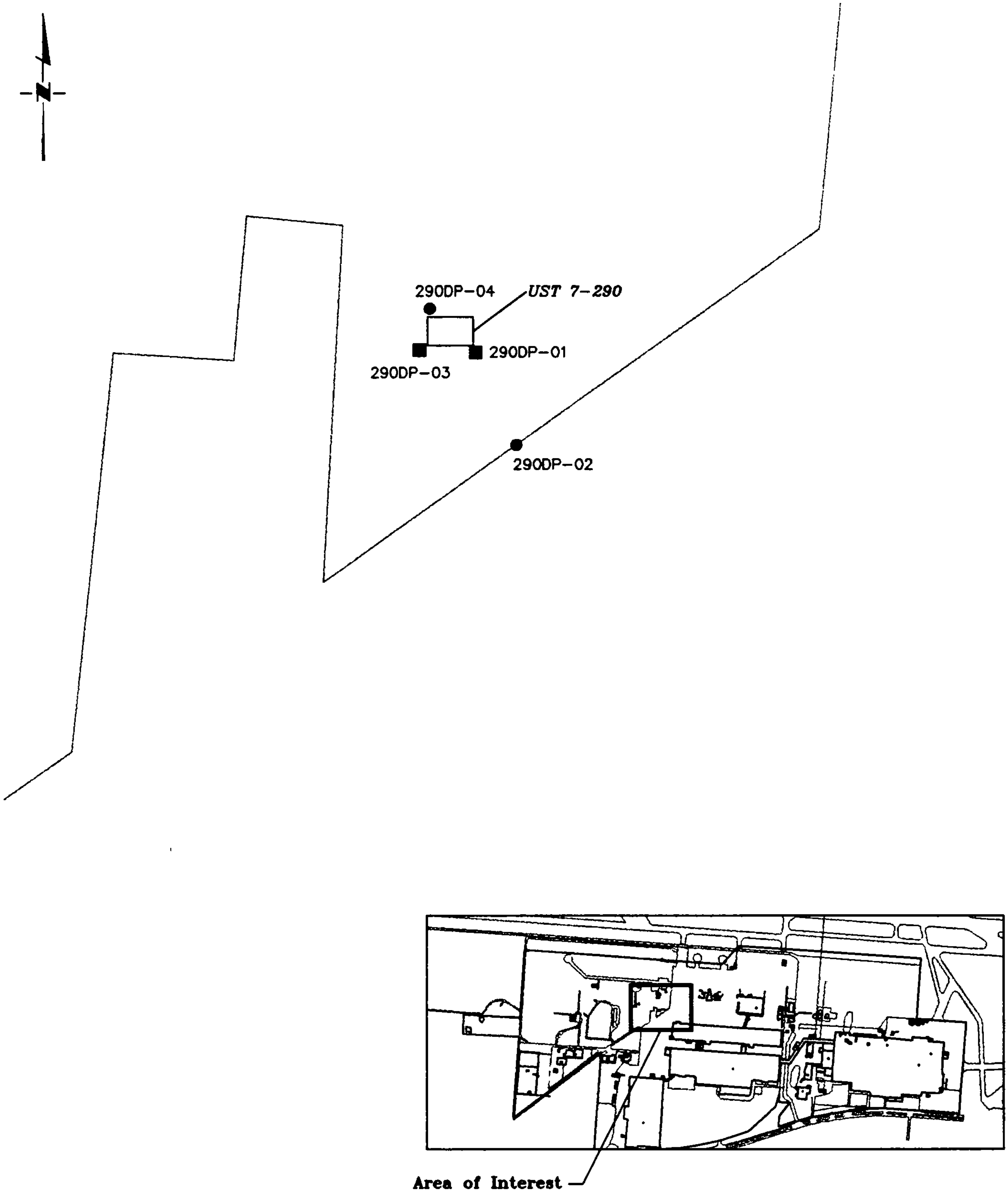
Number of Samples Collected at UST 7-290				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	7	2	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), SVOCs (SW3550/8270), and vertical conductivity.

(2) Groundwater analytical suite: Diesel range and gasoline range organics (modified SW8015), and SVOCs (SWW3510/8270).

4.22.3 Results

Numerous inorganics and DRO were detected in soil samples collected at UST 7-290; concentrations are presented in Table 4.22-1. Table 4.22-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Four boreholes were advanced at UST 7-290; depths ranged



Legend
- ● Direct Push Sample Location
- ■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.22-1

UST 7-290
Soil and Groundwater
Sample Locations

29179.4.20-23.DWG/PLT

Table 4.22-1

Summary of Analyte Concentrations for Soil Samples
UST 7-290

Sample ID Date Sampled Depth	290DP-0101N 2/16/99 0 - 4 ft bgs	290DP-0201N 2/16/99 0 - 4 ft bgs	290DP-0201D 2/16/99 0 - 4 ft bgs	290DP-0202N 2/16/99 4 - 8 ft bgs	290DP-0301N 2/16/99 0 - 4 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
2-Methylnaphthalene	42 J	410 U	410 U	400 U	400 U
Acenaphthene	50 J	410 U	410 U	400 U	400 U
Acenaphthylene	120 J	410 U	410 U	400 U	400 U
Anthracene	320 J	410 U	410 U	400 U	400 U
Benzo(a)anthracene	1000	410 U	410 U	400 U	400 U
Benzo(a)pyrene	820	410 U	410 U	400 U	400 U
Benzo(b)fluoranthene	1100	410 U	410 U	400 U	400 U
Benzo(g,h,i)perylene	420	410 U	410 U	400 U	400 U
Benzo(k)fluoranthene	460	410 U	410 U	400 U	400 U
bis(2-Ethylhexyl)phthalate	400 U	410 U	410 U	400 U	400 U
Butyl benzyl phthalate	400 U	410 U	410 U	400 U	400 U
Carbazole	120 J	410 U	410 U	400 U	400 U
Chrysene	1000	410 U	410 U	400 U	400 U
Dibenz(a,h)anthracene	120 J	410 U	410 U	400 U	400 U
Dibenzofuran	130 J	410 U	410 U	400 U	400 U
Fluoranthene	2700	410 U	410 U	400 U	400 U
Fluorene	220 J	410 U	410 U	400 U	400 U
Indeno(1,2,3-c,d)pyrene	400	410 U	410 U	400 U	400 U
Phenanthrene	2200	410 U	410 U	400 U	400 U
Pyrene	2200	410 U	410 U	400 U	400 U
Analyte	**TPH by M8015D (mg/kg)**				
PHC C10-C22	20	12 U	12 U	12 U	12 U

Table 4.22-1

Summary of Analyte Concentrations for Soil Samples
UST 7-290

Sample ID Date Sampled Depth	290DP-0302N 2/16/99 4 - 8 ft bgs	290DP-0302D 2/16/99 4 - 8 ft bgs	290DP-0401N 2/16/99 0 - 4 ft bgs	290DP-0402N 2/16/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
2-Methylnaphthalene	380 U	450 U	450 U	400 U
Acenaphthene	380 U	450 U	90 J	400 U
Acenaphthylene	380 U	450 U	450 U	400 U
Anthracene	380 U	450 U	200 J	400 U
Benzo(a)anthracene	380 U	450 U	850	280 J
Benzo(a)pyrene	380 U	450 U	750	300 J
Benzo(b)fluoranthene	380 U	450 U	1100	480
Benzo(g,h,i)perylene	380 U	450 U	420 J	200 J
Benzo(k)fluoranthene	380 U	450 U	460	190 J
bis(2-Ethylhexyl)phthalate	380 U	450 U	91 J	400 U
Butyl benzyl phthalate	380 U	450 U	69 J	400 U
Carbazole	380 U	450 U	210 J	76 J
Chrysene	380 U	450 U	990	420
Dibenz(a,h)anthracene	380 U	450 U	120 J	400 U
Dibenzofuran	380 U	450 U	58 J	400 U
Fluoranthene	380 U	450 U	2400	1000
Fluorene	380 U	450 U	92 J	400 U
Indeno(1,2,3-c,d)pyrene	380 U	450 U	420 J	180 J
Phenanthrene	380 U	450 U	1500	590
Pyrene	380 U	450 U	2000	800
Analyte	**TPH by M8015D (mg/kg)**			
PHC C10-C22	11 U	14 U	14 U	12 U

Table 4.22-1

Summary of Analyte Concentrations for Soil Samples (Continued)
UST 7-290

Sample ID Date Sampled Depth	290DP-0302N 2/16/99 4 - 8 ft bgs	290DP-0302D 2/16/99 4 - 8 ft bgs	290DP-0401N 2/16/99 0 - 4 ft bgs	290DP-0402N 2/16/99 4 - 8 ft bgs

Note: Sample IDs 290DP-0201D and 290DP-0302D are field duplicates

Key:

bgs	=	Below ground surface
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.22-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
UST 7-290

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
Acenaphthene	18000 00	0 09
Acenaphthylene	NA	0 12
Anthracene	91000 00	0 32
Butyl benzyl phthalate	NA	0 069
bis(2-Ethylhexyl)phthalate	860 00	0 091
Benzo(a)anthracene	31 00	1
Benzo(a)pyrene	3 10	0 82
Benzo(b)fluoranthene	31 00	1 1
Benzo(g,h,i)perylene	9100 00	0 42
Benzo(k)fluoranthene	310 00	0 46
Carbazole	2000	0 21
Chrysene	3100 00	1
Dibenz(a,h)anthracene	3 10	0 12
Dibenzofuran	3200	0 13
Fluorene	12000 00	0 22
Fluoranthene	12000 00	2 7
Indeno(1,2,3-c,d)pyrene	31 00	0 42
2-Methylnaphthalene	76000 00	0 042
Phenanthrene	91000 00	2 2
Pyrene	9100 00	2 2

Table 4.22-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil UST 7-290		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
TPH by M8015D		
PHC C10-C22	20000	20

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

from 8 to 12 feet bgs. The soils encountered varied from yellow brown silt to clay, with sand and gravel. Groundwater was encountered between 4 and 8 feet in two of the borings. A vertical conductivity value of 4.32×10^{-8} cm/s was reported for sample 290-02 collected at 4 to 8 feet bgs. Figure 4.22-1 shows the location where soil samples were collected.

There were no analytes detected in the two groundwater samples collected at UST 7-290. Figure 4.22-1 shows the location where groundwater samples were collected.

4.22.4 Data Validation Summary

Seven soil samples, two soil duplicates and two groundwater samples were collected at UST 7-290 and were analyzed for SVOCs and TPH (GRO and DRO).

All soil and groundwater data points are useable. The following provides a summary of data validation results for samples collected at UST 7-290:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	576	0	100%	4.2%	0%
TPH (GRO and DRO)	18	0	100%	16.7%	0%
Groundwater					
SVOCs	128	0	100%	1.6%	0%
TPH (GRO and DRO)	4	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.22.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. UST 7-290 is recommended for Category 4 designation.

4.23 UST 8-93

UST No. 93 (8-93) was formerly located west of Building 8 directly beneath the former Coal Pile Leachate Site (IRP Site 2). The UST was installed in 1941.

4.23.1 Site Summary

UST 8-93 was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 15,000 gallons and was used to store No. 2 fuel oil (Reference 138). Because of recorded releases, the UST site requires further investigation and sampling for fuel oil constituents.

4.23.2 Field Activities Conducted

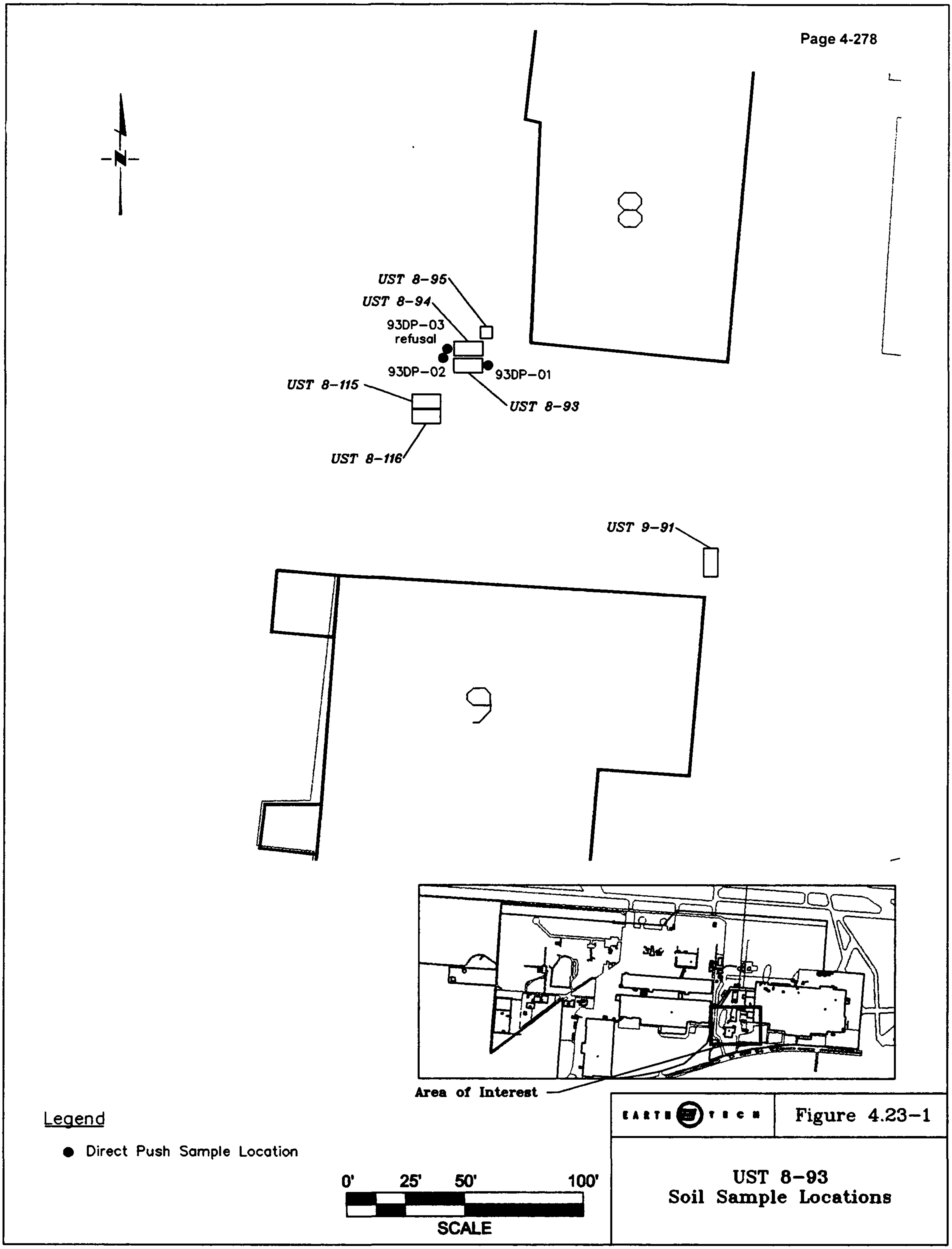
Two boreholes were advanced at this location. Three boreholes were proposed; however, refusal was encountered at 93DP-03 prior to sample collection. Each borehole was continuously sampled every five feet until groundwater or refusal. Three direct push soil samples were collected at UST 8-93 and analyzed for SVOCs, GRO and DRO. No groundwater samples were collected. Sample locations are shown in Figure 4.23-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at UST 8-93				
Sampling Point	Soil(1)	Groundwater	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	3	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), SVOCs (SW3550/8270), and vertical conductivity.

4.23.3 Results

Numerous SVOCs were detected in soil samples collected at UST 8-93; concentrations are presented in Table 4.23-1. Table 4.23-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Two boreholes were advanced to 10 feet bgs at UST 8-93. The soils encountered ranged from yellow brown/olive brown silt to clay, with gravel and sand. Groundwater was not encountered in any borings. No sample for vertical conductivity determination was collected. However, a value of 7.38×10^{-7} cm/s was reported at nearby UST 9-91.



EARTH TECH

Figure 4.23-1

UST 8-93
Soil Sample Locations

29179.4.20-23.DWG/PLT

Table 4.23-1

Summary of Analyte Concentrations for Soil Samples
UST 8-93

Sample ID Date Sampled Depth	93DP-0101N 2/12/99 8 - 12 ft bgs	93DP-0101D 2/12/99 8 - 12 ft bgs	93DP-0201N 2/18/99 0 - 4 ft bgs	93DP-0202N 2/18/99 8 - 10 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
Benzo(a)anthracene	400 U	360 U	380 U	59 J
Benzo(b)fluoranthene	400 U	360 U	48 J	66 J
Chrysene	400 U	360 U	380 U	66 J
Fluoranthene	400 U	360 U	380 U	150 J
Phenanthrene	400 U	360 U	380 U	74 J
Pyrene	400 U	360 U	47 J	110 J
Analyte	**TPH by M8015D (mg/kg)**			
PHC as Gasoline	0 37	0 31	0 12 U	0 12 U

Note: Sample ID 93DP-0101D is a field duplicate

Key:

bgs	=	Below ground surface
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.23-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil UST 8-93		
Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
Benzo(a)anthracene	31 00	0 059
Benzo(b)fluoranthene	31 00	0 066
Chrysene	3100 00	0 066
Fluoranthene	12000 00	0 15
Phenanthrene	91000 00	0 074
Pyrene	9100 00	0 11
TPH by M8015D		
PHC as Gasolıne	8000	0 37

Note: Shaded cells indicate that the maxımum concentratıon detected for the chemıcal at thıs sıte exceeds the Sıte-Adjusted VAP Standard for Soıl

Key: NA = Not applıcable A VAP Standard for Soıl ıs not avaılable for thıs chemıcal
mg/kg = Mıllıgrams per kılogram

4.23.4 Data Validation Summary

Three soil samples and one soil duplicate were collected at UST 8-93 and were analyzed for SVOCs and TPH (GRO and DRO).

All soil data points are useable. The following provides a summary of data validation results for samples collected at UST 8-93:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	256	0	100%	3.1%	0%
TPH (GRO and DRO)	8	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.23.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. UST 8-93 is recommended for Category 4 designation.

4.24 UST 8-94

UST No. 94 (8-94) was formerly located west of Building 8 directly beneath the former Coal Pile Leachate Site (IRP Site 2). The UST was installed in 1941.

4.24.1 Site Summary

UST 8-94 was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 15,000 gallons and was used to store No. 2 fuel oil (Reference 138). Because of recorded releases, the UST site requires further investigation and sampling for fuel oil constituents.

4.24.2 Field Activities Conducted

Three boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Eight direct push soil samples and one groundwater sample were collected at UST 8-94 and analyzed for SVOCs, GRO and DRO. Sample locations are shown in Figure 4.24-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at UST 8-94				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	8	1	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), SVOCs (SW3550/8270), and vertical conductivity.

(2) Groundwater analytical suite: Diesel range and gasoline range organics (modified SW8015) and SVOCs (SW3510/8270).

4.24.3 Results

Numerous SVOCs were detected in one soil sample from 0-4 feet bgs, and TPH was detected in the soil samples collected at UST 8-94; concentrations are presented in Table 4.24-1. Table 4.24-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Three boreholes were advanced at UST 8-94; depths ranged from 12 to 16 feet bgs. The soils encountered varied from yellow brown/olive green clayey silt to clay, with sand and gravel. Groundwater was encountered between 10 and 16 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 7.38×10^{-7} cm/s was reported at nearby UST 9-91.

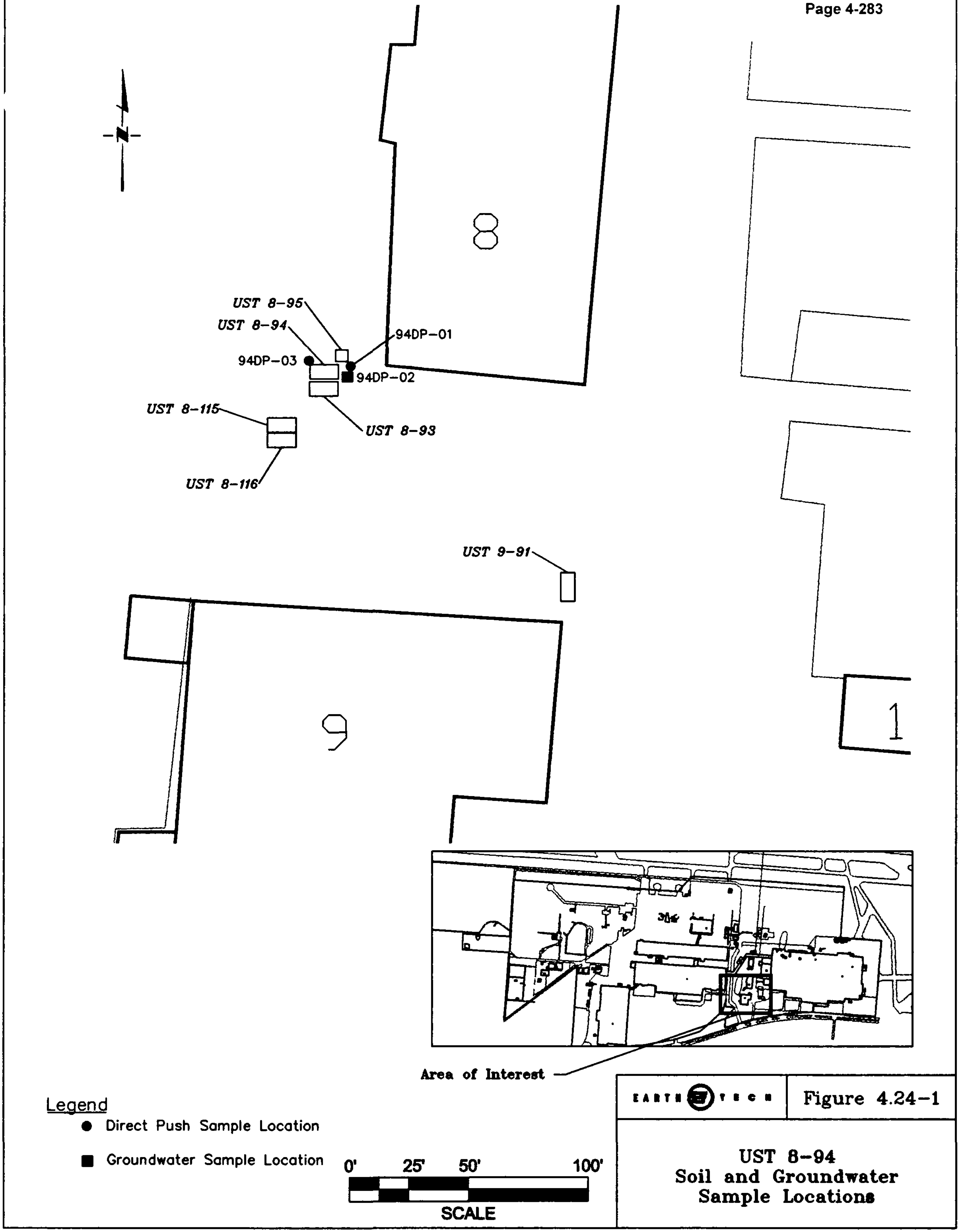


Figure 4.24-1

UST 8-94
Soil and Groundwater
Sample Locations

Table 4.24-1

Summary of Analyte Concentrations for Soil Samples
UST 8-94

Sample ID Date Sampled Depth	94DP-0101N 2/18/99 0 - 4 ft bgs	94DP-0101D 2/18/99 0 - 4 ft bgs	94DP-0102N 2/18/99 4 - 8 ft bgs	94DP-0103N 2/18/99 8 - 12 ft bgs	94DP-0103D 2/18/99 8 - 12 ft bgs	94DP-0104N 2/18/99 12 - 16 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
Anthracene	48 J	410 U	410 U	390 U	420 U	410 U
Benzo(a)anthracene	120 J	410 U	410 U	390 U	420 U	410 U
Benzo(a)pyrene	120 J	410 U	410 U	390 U	420 U	410 U
Benzo(b)fluoranthene	190 J	410 U	410 U	390 U	420 U	410 U
Benzo(g,h,ı)perylene	86 J	410 U	410 U	390 U	420 U	410 U
Benzo(k)fluoranthene	73 J	410 U	410 U	390 U	420 U	410 U
Chrysene	140 J	410 U	410 U	390 U	420 U	410 U
Fluoranthene	240 J	410 U	410 U	390 U	420 U	410 U
Indeno(1,2,3-c,d)pyrene	83 J	410 U	410 U	390 U	420 U	410 U
Phenanthrene	190 J	410 U	410 U	390 U	420 U	410 U
Pyrene	180 J	410 U	410 U	390 U	420 U	410 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC as Gasoline	0 13 U	0 13 U	0 12 U	0 12 U	0 13 U	0 13 U
PHC C10-C22	34	24	12 U	12 U	13 U	13 U

Table 4.24-1

Summary of Analyte Concentrations for Soil Samples
UST 8-94

Sample ID Date Sampled Depth	94DP-0201N 2/12/99 0 - 4 ft bgs	94DP-0201D 2/12/99 0 - 4 ft bgs	94DP-0202N 2/12/99 4 - 8 ft bgs	94DP-0301N 2/12/99 0 - 4 ft bgs	94DP-0302N 2/12/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
Anthracene	410 U	400 U	420 U	410 U	420 U
Benzo(a)anthracene	410 U	400 U	420 U	410 U	420 U
Benzo(a)pyrene	410 U	400 U	420 U	410 U	420 U
Benzo(b)fluoranthene	410 U	400 U	420 U	410 U	420 U
Benzo(g,h,i)perylene	410 U	400 U	420 U	410 U	420 U
Benzo(k)fluoranthene	410 U	400 U	420 U	410 U	420 U
Chrysene	410 U	400 U	420 U	410 U	420 U
Fluoranthene	410 U	400 U	420 U	410 U	420 U
Indeno(1,2,3-c,d)pyrene	410 U	400 U	420 U	410 U	420 U
Phenanthrene	410 U	400 U	420 U	410 U	420 U
Pyrene	410 U	400 U	420 U	410 U	420 U
Analyte	**TPH by M8015D (mg/kg)**				
PHC as Gasoline	0 21	0 2	0 18	0 13	0 13 U
PHC C10-C22	12 U	12 U	13 U	12 U	13 U

Note: Sample IDs 94DP-0101D, 94DP-0103D and 94DP-0201D are field duplicates

Key:

bgs	=	Below ground surface
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.24-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
UST 8-94

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
Anthracene	91000 00	0 048
Benzo(a)anthracene	31 00	0 12
Benzo(a)pyrene	3 10	0 12
Benzo(b)fluoranthene	31 00	0 19
Benzo(g,h,ı)perylene	9100 00	0 086
Benzo(k)fluoranthene	310 00	0 073
Chrysene	3100 00	0 14
Fluoranthene	12000 00	0 24
Indeno(1,2,3-c,d)pyrene	31 00	0 083
Phenanthrene	91000 00	0 19
Pyrene	9100 00	0 18
TPH by M8015D		
PHC C10-C22	20000	34
PHC as Gasolıne	8000	0 21

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Bis (2-ethylhexyl)phthalate and DRO were detected in the groundwater sample collected at UST 8-94; concentrations are presented in Table 4.24-3. There were no detected concentrations that exceeded the respective VAP generic unrestricted potable use standard.

4.24.4 Data Validation Summary

Eight soil samples, three soil duplicates and one groundwater sample were collected at UST 8-94 and were analyzed for SVOCs and TPH (GRO and DRO).

All soil and groundwater data points are useable. The following provides a summary of data validation results for samples collected at UST 8-94:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	320	0	100%	10.6%	0%
TPH (GRO and DRO)	22	0	100%	9%	0%
Groundwater					
SVOCs	64	0	100%	1.6%	0%
TPH (GRO and DRO)	2	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.24.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. UST 8-94 is recommended for Category 4 designation.

Table 4.24-3

Summary of Analyte Concentrations for Groundwater Samples
UST 8-94

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	94GW-02N 2/12/99
Analyte	**Semivolatiles by SW8270 (ug/L)**	
bis(2-Ethylhexyl)phthalate	NA	3 6 J
Analyte	**TPH by M8015 (ug/L)**	
PHC C10-C22	NA	540

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter

Table 4.24-3 Summary of Analyte Concentrations for Groundwater Samples – UST 8-94

4.25 UST 8-95

4.25.1 Site Summary

UST No. 95 (8-95) was formerly located west of Building 8 directly beneath the former Coal Pile Leachate Site (IRP Site 2). The UST was installed in 1941. It was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 6,000 gallons and was used to store No. 2 fuel oil (Reference 138). Because of recorded releases, the UST site requires further investigation and sampling for fuel oil constituents.

4.25.2 Field Activities Conducted

Four boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Ten direct push soil samples and two groundwater samples were collected at UST 8-95 and analyzed for SVOCs, GRO and DRO. Sample locations are shown in Figure 4.25-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

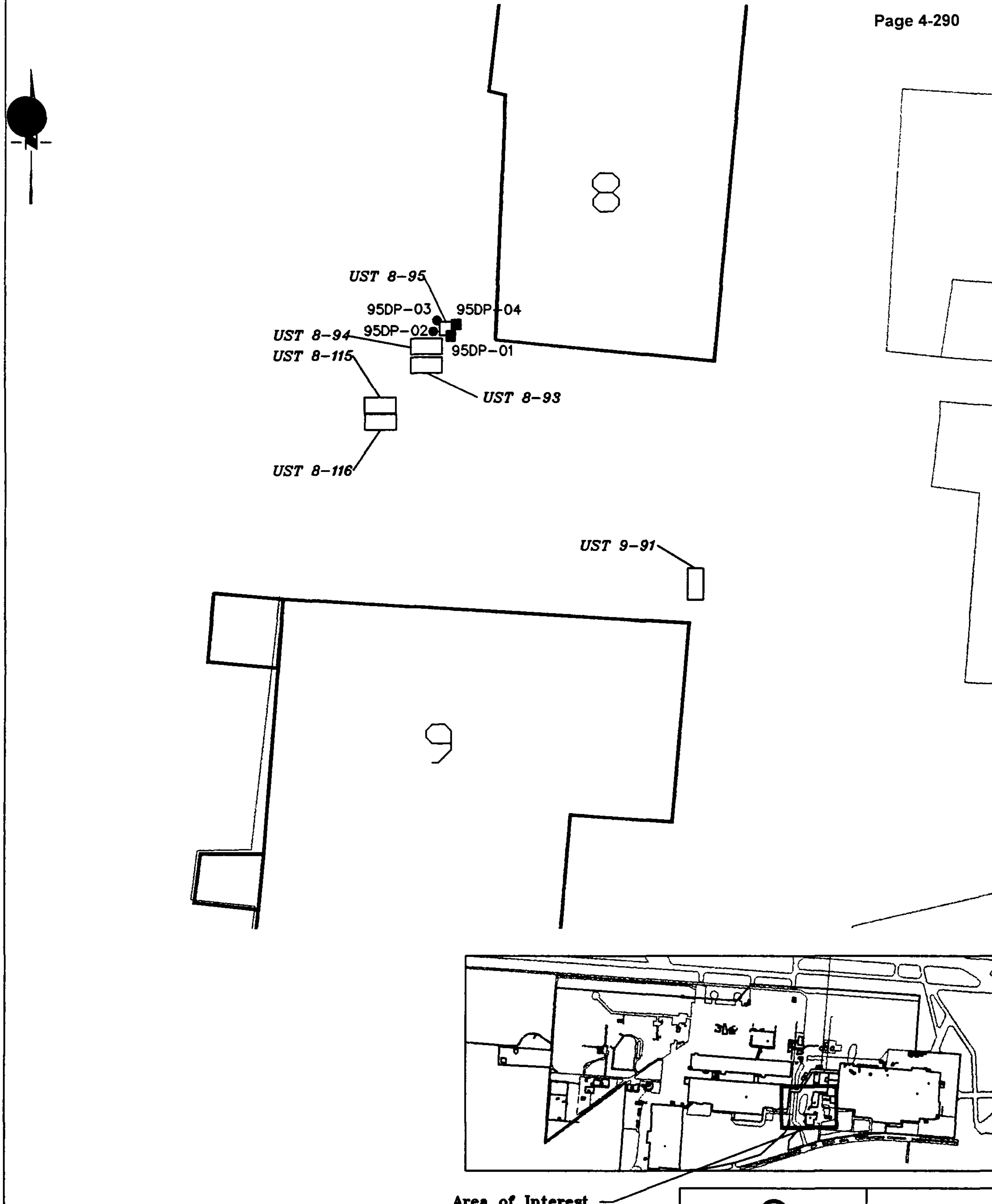
Number of Samples Collected at UST 8-95				
Sampling Point	Soil(1)	Groundwater(2)	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	10	2	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), SVOCs (SW3550/8270), and vertical conductivity.

(2) Groundwater analytical suite: Diesel range and gasoline range organics (modified SW8015) and SVOCs (SW3510/8270).

4.25.3 Results

TPH and numerous SVOCs were detected in soil samples collected at UST 8-95; concentrations are presented in Table 4.25-1. Table 4.25-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Four boreholes were advanced at UST 8-95; depths ranged from 8 to 16 feet bgs. The soils encountered varied from yellow brown/gray clayey silt to clay, with trace sand and little gravel. Groundwater was encountered between 8 and 16 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 7.38×10^{-7} cm/s was reported at nearby UST 9-91.



Legend
- ● Direct Push Sample Location
- ■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.25-1

UST 8-95
Soil and Groundwater
Sample Locations

29179.4.20-25.DWG/.PLT

Table 4.25-1

Summary of Analyte Concentrations for Soil Samples
UST 8-95

Sample ID / Date Sampled / Depth	95DP-0101N 2/18/99 0 - 4 ft bgs	95DP-0102N 2/18/99 4 - 8 ft bgs	95DP-0103N 2/18/99 8 - 12 ft bgs	95DP-0201N 2/18/99 0 - 4 ft bgs	95DP-0202N 2/18/99 4 - 8 ft bgs	95DP-0202D 2/18/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
Benzo(a)anthracene	410 U	410 U	390 U	390 U	430 U	430 U
Benzo(a)pyrene	410 U	410 U	390 U	390 U	430 U	430 U
Benzo(b)fluoranthene	410 U	410 U	390 U	390 U	430 U	430 U
Benzo(g,h,i)perylene	410 U	410 U	390 U	390 U	430 U	430 U
bis(2-Ethylhexyl)phthalate	410 U	410 U	390 U	390 U	430 U	430 U
Chrysene	410 U	410 U	390 U	390 U	430 U	430 U
Fluoranthene	410 U	410 U	390 U	390 U	430 U	430 U
Indeno(1,2,3-c,d)pyrene	410 U	410 U	390 U	390 U	430 U	430 U
Phenanthrene	410 U	410 U	390 U	62 J	430 U	430 U
Pyrene	410 U	410 U	390 U	390 U	430 U	430 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC as Gasoline	0 18	0.12 U	0.12 U	0 12	0 13 U	0 13 U
PHC C10-C22	12 U	12 U	12 U	14	21	20

Table 4.25-1

Summary of Analyte Concentrations for Soil Samples
UST 8-95

Sample ID Date Sampled Depth	95DP-0301N 2/18/99 4 - 8 ft bgs	95DP-0302N 2/18/99 8 - 12 ft bgs	95DP-0401N 2/18/99 0 - 4 ft bgs	95DP-0402N 2/18/99 4 - 8 ft bgs	95DP-0402D 2/18/99 4 - 8 ft bgs	95DP-0403N 2/18/99 8 - 12 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**					
Benzo(a)anthracene	410 U	390 U	77 J	410 U	430 U	440 U
Benzo(a)pyrene	410 U	390 U	80 J	410 U	430 U	440 U
Benzo(b)fluoranthene	410 U	390 U	110 J	410 U	430 U	440 U
Benzo(g,h,i)perylene	410 U	390 U	62 J	410 U	430 U	440 U
bis(2-Ethylhexyl)phthalate	410 U	390 U	74 J	410 U	430 U	440 U
Chrysene	410 U	390 U	98 J	410 U	430 U	440 U
Fluoranthene	410 U	390 U	160 J	410 U	430 U	440 U
Indeno(1,2,3-c,d)pyrene	410 U	390 U	58 J	410 U	430 U	440 U
Phenanthrene	410 U	390 U	99 J	410 U	430 U	440 U
Pyrene	410 U	390 U	150 J	410 U	430 U	440 U
Analyte	**TPH by M8015D (mg/kg)**					
PHC as Gasoline	0 12 U	0 12 U	0 12 U	0 13 U	0 13 U	0 13 U
PHC C10-C22	12 U	13	49	24	13 U	13 U

Note: Sample IDs 95DP-0202D and 95DP-0402D are field duplicates

Key:

bgs	=	Below ground surface
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.25-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
UST 8-95

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
bıs(2-Ethylhexyl)phthalate	860 00	0 074
Benzo(a)anthracene	31.00	0 077
Benzo(a)pyrene	3 10	0 08
Benzo(b)fluoranthene	31 00	0 11
Benzo(g,h,ı)perylene	9100 00	0 062
Chrysene	3100 00	0 098
Fluoranthene	12000 00	0 16
Indeno(1,2,3-c,d)pyrene	31 00	0 058
Phenanthrene	91000 00	0 099
Pyrene	9100 00	0 15
TPH by M8015D		
PHC C10-C22	20000	49
PHC as Gasoline	8000	0 18

Note: Shaded cells ındicate that the maxımum concentration detected for the chemıcal at thıs site exceeds the Site-Adjusted VAP Standard for Soıl

Key: NA = Not applıcable A VAP Standard for Soil ıs not avaılable for this chemıcal
mg/kg = Mıllıgrams per kilogram

Bis (2-ethylhexyl)phthalate and DRO were detected in groundwater samples collected at UST 8-95; concentrations are presented in Table 4.24-3. There were no detected concentrations that exceeded the respective VAP standard.

4.25.4 Data Validation Summary

Ten soil samples, two soil duplicates and two groundwater samples were collected at UST 8-95 and were analyzed for SVOCs and TPH (GRO and DRO).

All soil and groundwater data points are useable. The following provides a summary of data validation results for samples collected at UST 8-95:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	768	0	100%	1.4%	0%
TPH (GRO and DRO)	24	0	100%	8.3%	0%
Groundwater					
SVOCs	128	0	100%	0%	0%
TPH (GRO and DRO)	4	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.25.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. UST 8-95 is recommended for Category 4 designation.

Table 4.25-3

Summary of Analyte Concentrations for Groundwater Samples UST 8-95			
Sample ID Date Sampled	**VAP Generic Unrestricted Potable Use Standard**	**95GW-01N 2/18/99**	**95GW-04N 2/18/99**
Analyte	**Semivolatiles by SW8270 (ug/L)**		
bis(2-Ethylhexyl)phthalate	NA	10 U	18
Analyte	**TPH by M8015 (ug/L)**		
PHC C10-C22	NA	280	100 U

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

- J = Estimated
- NA = Not available
- U = Not detected
- ug/L = Micrograms per Liter

4.26 UST 8-115

UST No. 115 (8-115) was formerly located west of Building 8 directly beneath the former Coal Pile Leachate Site (IRP Site 2). The UST was installed in 1955.

4.26.1 Site Summary

UST 8-115 was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 15,000 gallons and was used to store No. 2 fuel oil. Soil samples from the west wall of the excavation stockpile contained benzene at concentrations that exceeded the detection limit (Reference 138). Because of recorded releases, the UST site requires further investigation and sampling for fuel oil constituents.

4.26.2 Field Activities Conducted

Three boreholes were advanced at this location. Four boreholes were proposed; however, refusal was encountered at 115DP-02 prior to any sample collection. Each borehole was continuously sampled every five feet until groundwater or refusal. Seven direct push soil samples and one groundwater sample were collected at UST 8-115 and analyzed for SVOCs, GRO and DRO. Sample locations are shown in Figure 4.26-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

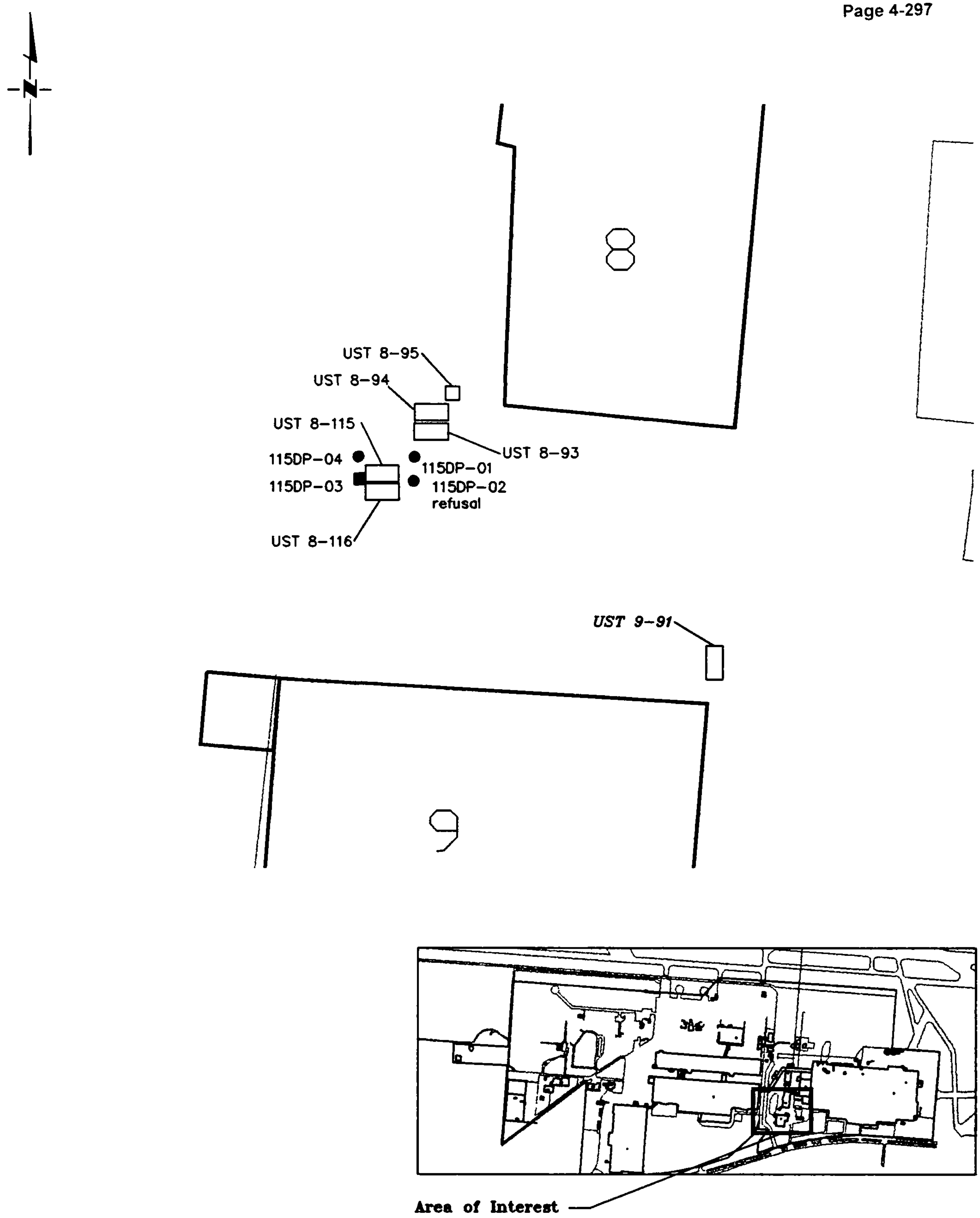
Number of Samples Collected at UST 8-115				
Sampling Point	**Soil(1)**	**Groundwater(2)**	**Soil Gas**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	7	1	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), SVOCs (SW3550/8270), and vertical conductivity.

(2) Groundwater analytical suite: Diesel range and gasoline range organics (modified SW8015) and SVOCs (SW3510/8270).

4.26.3 Results

Numerous SVOCs were detected in soil samples collected at UST 8-115; concentrations are presented in Table 4.26-1. Table 4.26-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. One borehole was advanced to 16 feet bgs at UST 8-115. The soils



gend
- ● Direct Push Sample Location
- ■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH | Figure 4.26-1

UST 8-115
Soil and Groundwater
Sample Locations

29179.4.26-31DWG/PLT

Table 4.26-1

Summary of Analyte Concentrations for Soil Samples
UST 8-115

Sample ID / Date Sampled / Depth	115DP-0101N 2/15/99 4 - 8 ft bgs	115DP-0101D 2/15/99 4 - 8 ft bgs	115DP-0102N 2/15/99 8 - 12 ft bgs	115DP-0301N 2/12/99 0 - 4 ft bgs	115DP-0302N 2/12/99 4 - 8 ft bgs	115DP-0303N 2/12/99 8 - 12 ft bgs	115DP-0401N 2/12/99 4 - 8 ft bgs	115DP-0402N 2/12/99 8 - 12 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**							
2,4-Dimethylphenol	410 U	390 U	410 U	350 U	350 U	1000 J	370 U	370 U
2-Methylnaphthalene	410 U	390 U	410 U	87 J	160 J	3800 U	170 J	98 J
Acenaphthene	410 U	390 U	410 U	350 U	350 U	1500 J	370 U	370 U
Anthracene	410 U	390 U	410 U	61 J	350 U	3800 U	370 U	370 U
Benzo(a)anthracene	410 U	65 J	410 U	270 J	100 J	3800 U	370 U	370 U
Benzo(a)pyrene	410 U	79 J	410 U	230 J	120 J	3800 U	370 U	47 J
Benzo(b)fluoranthene	410 U	130 J	410 U	330 J	150 J	3800 U	370 U	57 J
Benzo(g,h,i)perylene	410 U	62 J	410 U	120 J	90 J	3800 U	370 U	370 U
Benzo(k)fluoranthene	410 U	53 J	410 U	120 J	56 J	3800 U	370 U	370 U
bis(2-Ethylhexyl)phthalate	410 U	87 J	410 U	350 U	350 U	3800 U	370 U	370 U
Carbazole	410 U	390 U	410 U	41 J	350 U	3800 U	370 U	370 U
Chrysene	410 U	110 J	410 U	290 J	120 J	3800 U	370 U	370 U
di-n-Butylphthalate	45 J	390 U	410 U	350 U	350 U	3800 U	370 U	370 U
Dibenzofuran	410 U	390 U	410 U	350 U	350 U	660 J	370 U	370 U
Fluoranthene	410 U	80 J	410 U	600	210 J	690 J	370 U	70 J
Fluorene	410 U	390 U	410 U	350 U	350 U	1900 J	370 U	370 U
Indeno(1,2,3-c,d)pyrene	410 U	50 J	410 U	120 J	85 J	3800 U	370 U	370 U
Naphthalene	410 U	390 U	410 U	47 J	36 J	3800 U	370 U	370 U
Phenanthrene	410 U	42 J	410 U	340 J	200 J	920 J	140 J	180 J
Pyrene	410 U	110 J	410 U	610	210 J	1700 J	370 U	150 J
Analyte	**TPH by M8015D (mg/kg)**							
PHC as Gasoline	0 12 U	0 12 U	0 12 U	0 24	0 43	6	0 19	16

Table 4.26-1

Summary of Analyte Concentrations for Soil Samples (Continued)
UST 8-115

Sample ID Date Sampled Depth	115DP-0101N 2/15/99 4 - 8 ft bgs	115DP-0101D 2/15/99 4 - 8 ft bgs	115DP-0102N 2/15/99 8 - 12 ft bgs	115DP-0301N 2/12/99 0 - 4 ft bgs	115DP-0302N 2/12/99 4 - 8 ft bgs	115DP-0303N 2/12/99 8 - 12 ft bgs	115DP-0401N 2/12/99 4 - 8 ft bgs	115DP-0402N 2/12/99 8 - 12 ft bgs
PHC C10-C22	12 U	12 U	12 U	11 U	47	1200	43	67

Note: Sample ID 115DP-0101D is a field duplicate

Key:

bgs	=	Below ground surface
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.26-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
UST 8-115

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
Acenaphthene	18000 00	1 5
Anthracene	91000 00	0 061
bıs(2-Ethylhexyl)phthalate	860 00	0 087
Benzo(a)anthracene	31 00	0 27
Benzo(a)pyrene	3 10	0 23
Benzo(b)fluoranthene	31 00	0 33
Benzo(g,h,ı)perylene	9100 00	0 12
Benzo(k)fluoranthene	310 00	0 12
Carbazole	2000	0 041
Chrysene	3100 00	0 29
Dıbenzofuran	3200	0 66
2,4-Dımethylphenol	NA	1
di-n-Butylphthalate	NA	0 045
Fluorene	12000 00	1 9
Fluoranthene	12000 00	0 69
Indeno(1,2,3-c,d)pyrene	31 00	0 12
2-Methylnaphthalene	76000 00	0 17
Naphthalene	22000 00	0 047
Phenanthrene	91000 00	0 92
Pyrene	9100 00	1 7

Table 4.26-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil UST 8-115		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
TPH by M8015D		
PHC C10-C22	20000	1200
PHC as Gasoline	8000	16

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

encountered to were mostly brown to olive green clay with trace silt and fine to coarse sand. Yellow brown clayey sand was encountered from 12 to 15 feet bgs. Groundwater was encountered at 12 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 7.38×10^{-7} cm/s was reported at nearby UST 9-91.

DRO was detected in the groundwater sample collected at UST 8-115; the concentration is presented in Table 4.26-3. There is no groundwater standard for comparison with TPH. Figure 4.26-2 shows the location of the elevated concentration.

4.26.4 Data Validation Summary

Seven soil samples, one soil duplicate and one groundwater sample were collected at UST 8-115 and were analyzed for SVOCs and TPH (GRO and DRO).

All soil and groundwater data points are useable. The following provides a summary of data validation results for samples collected at UST 8-115:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	512	0	100%	13.9%	0%
TPH (GRO and DRO)	16	0	100%	0%	0%
Groundwater					
SVOCs	64	0	100%	0%	0%
TPH (GRO and DRO)	2	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.26.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. UST 8-115 is recommended for Category 4 designation.

Table 4.26-3

Summary of Analyte Concentrations for Groundwater Samples
UST 8-115

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	115GW-03N 2/12/99
Analyte	**TPH by M8015 (ug/L)**	
PHC C10-C22	NA	2800

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter

4.27 UST 8-116

UST No. 116 (8-116) was formerly located west of Building 8 directly beneath the former Coal Pile Leachate Site (IRP Site 2). The UST was installed in 1955.

4.27.1 Site Summary

UST 8-116 was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 15,000 gallons and was used to store No. 2 fuel oil. Soil samples from the west wall of the excavation stockpile contained benzene at concentrations that exceeded the detection limit (Reference 138). Because of recorded releases, the UST site requires further investigation and sampling for fuel oil constituents.

4.27.2 Field Activities Conducted

Four boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Ten direct push soil samples and two groundwater samples were collected at UST 8-116 and analyzed for SVOCs, GRO and DRO. Sample locations are shown in Figure 4.27-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

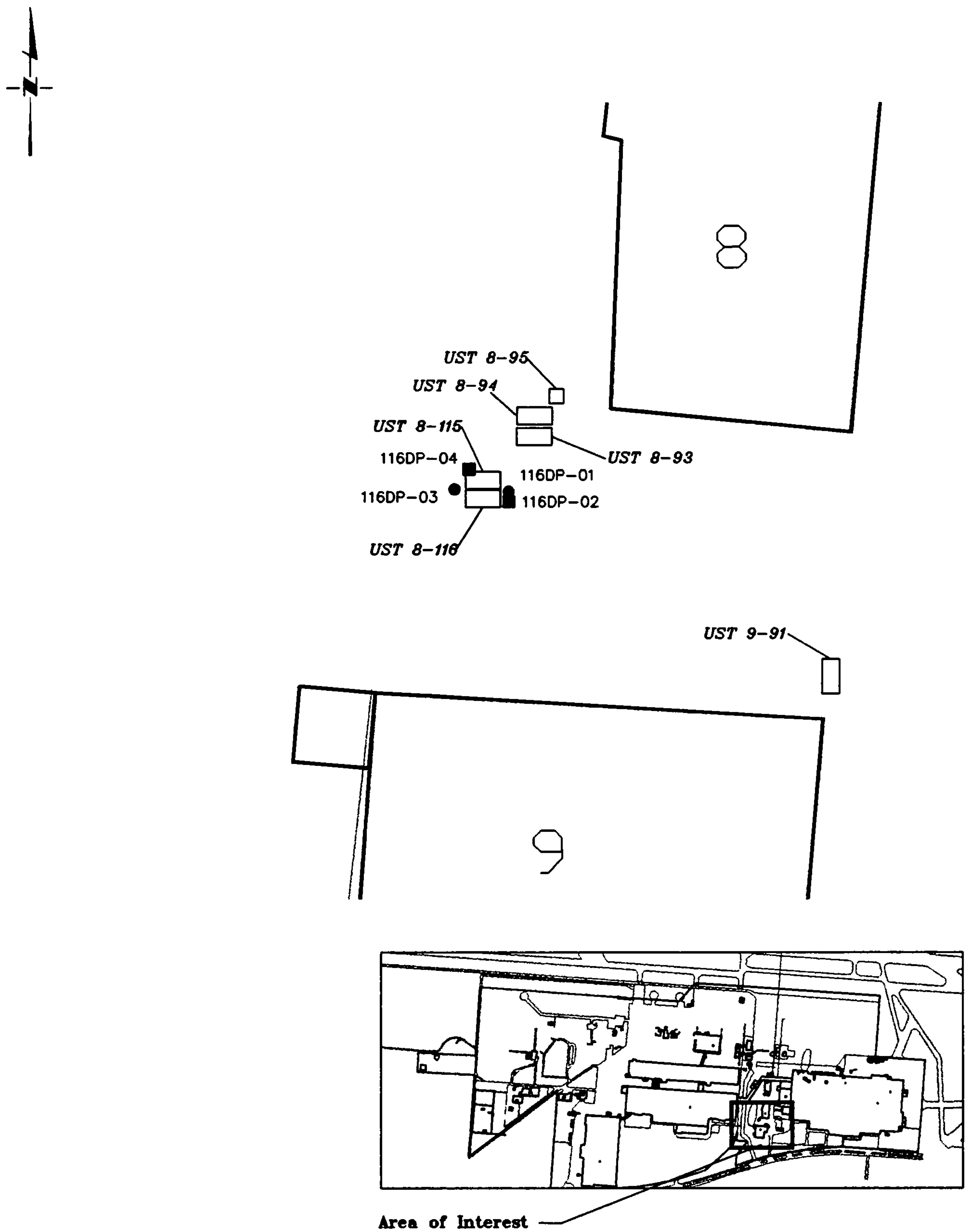
Number of Samples Collected at UST 8-116				
Sampling Point	**Soil(1)**	**Groundwater(2)**	**Soil Gas**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	10	2	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), SVOCs (SW3550/8270), and vertical conductivity.

(2) Groundwater analytical suite: Diesel range and gasoline range organics (modified SW8015) and SVOCs (SW3510/8270).

4.27.3 Results

TPH and numerous SVOCs were detected in soil samples collected at UST 8-116; concentrations are presented in Table 4.27-1. Table 4.27-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Four boreholes were advanced at UST 8-116; depths ranged from 12 to 16 feet bgs. The soils encountered varied from olive green clay to sand. Groundwater was encountered between 8 and 12 feet bgs in three borings. No sample for vertical conductivity determination was collected. However, a value of 7.38×10^{-7} cm/s was reported at nearby UST 9-91.



Legend
- ● Direct Push Sample Location
- ■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.27-1

UST 8-116
Soil and Groundwater Sample Locations

29179.4.26-31DWG/.PLT

Table 4.27-1

Summary of Analyte Concentrations for Soil Samples
UST 8-116

Sample ID Date Sampled Depth	116DP-0101N 2/15/99 0 - 4 ft bgs	116DP-0102N 2/15/99 4 - 8 ft bgs	116DP-0102D 2/15/99 4 - 8 ft bgs	116DP-0103N 2/15/99 8 - 12 ft bgs	116DP-0201N 2/15/99 0 - 4 ft bgs	116DP-0202N 2/15/99 4 - 8 ft bgs	116DP-0202D 2/15/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**						
2-Methylnaphthalene	1500 U	430 U	410 U	410 U	3800 U	430 U	410 U
Acenaphthene	1500 U	430 U	410 U	410 U	3800 U	430 U	410 U
Anthracene	1500 U	430 U	410 U	410 U	3800 U	430 U	410 U
Benzo(a)anthracene	1500 U	430 U	410 U	410 U	530 J	430 U	410 U
Benzo(a)pyrene	260 J	430 U	410 U	410 U	710 J	430 U	410 U
Benzo(b)fluoranthene	410 J	430 U	410 U	410 U	1000 J	430 U	410 U
Benzo(g,h,i)perylene	820 J	430 U	410 U	410 U	1500 J	430 U	410 U
Benzo(k)fluoranthene	180 J	430 U	410 U	410 U	3800 U	430 U	410 U
Carbazole	1500 U	430 U	410 U	410 U	3800 U	430 U	410 U
Chrysene	270 J	430 U	410 U	410 U	1000 J	430 U	410 U
Dibenzofuran	1500 U	430 U	410 U	410 U	3800 U	430 U	410 U
Fluoranthene	150 J	430 U	410 U	410 U	470 J	430 U	410 U
Fluorene	1500 U	430 U	410 U	410 U	3800 U	430 U	410 U
Indeno(1,2,3-c,d)pyrene	240 J	430 U	410 U	410 U	650 J	430 U	410 U
Naphthalene	1500 U	430 U	410 U	410 U	3800 U	430 U	410 U
Phenanthrene	1500 U	430 U	410 U	410 U	3800 U	430 U	410 U
Pyrene	350 J	430 U	410 U	410 U	670 J	430 U	410 U
Analyte	**TPH by M8015D (mg/kg)**						
PHC as Gasoline	0 11 U	0 13 U	0.13 U	0 12 U	0 12 U	0 13 U	0 12 U
PHC C10-C22	520	13 U	13 U	12 U	670	13	20

Table 4.27-1

Summary of Analyte Concentrations for Soil Samples
UST 8-116

Sample ID Date Sampled Depth	116DP-0203N 2/15/99 8 - 12 ft bgs	116DP-0301N 2/15/99 4 - 8 ft bgs	116DP-0302N 2/15/99 8 - 12 ft bgs	116DP-0401N 2/15/99 4 - 8 ft bgs	116DP-0402N 2/15/99 8 - 12 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
2-Methylnaphthalene	420 U	85 J	7500 U	140 J	390
Acenaphthene	420 U	380 U	810 J	420 U	90 J
Anthracene	420 U	380 U	7500 U	420 U	170 J
Benzo(a)anthracene	420 U	53 J	7500 U	110 J	210 J
Benzo(a)pyrene	420 U	57 J	7500 U	120 J	200 J
Benzo(b)fluoranthene	55 J	75 J	7500 U	130 J	260 J
Benzo(g,h,i)perylene	77 J	380 U	7500 U	150 J	96 J
Benzo(k)fluoranthene	420 U	380 U	7500 U	51 J	100 J
Carbazole	420 U	380 U	7500 U	420 U	94 J
Chrysene	57 J	68 J	7500 U	150 J	240 J
Dibenzofuran	420 U	380 U	7500 U	420 U	89 J
Fluoranthene	420 U	90 J	7500 U	160 J	540
Fluorene	420 U	380 U	1200 J	420 U	140 J
Indeno(1,2,3-c,d)pyrene	420 U	380 U	7500 U	70 J	99 J
Naphthalene	420 U	380 U	7500 U	420 U	70 J
Phenanthrene	420 U	130 J	860 J	160 J	910
Pyrene	43 J	91 J	1300 J	310 J	500
Analyte	**TPH by M8015D (mg/kg)**				
PHC as Gasoline	0 13 U	0 12 U	1300	0 13 U	1 5
PHC C10-C22	28	140	1900	200	270

Table 4.27-1

Summary of Analyte Concentrations for Soil Samples (Continued)
UST 8-116

Sample ID Date Sampled Depth	116DP-0203N 2/15/99 8 - 12 ft bgs	116DP-0301N 2/15/99 4 - 8 ft bgs	116DP-0302N 2/15/99 8 - 12 ft bgs	116DP-0401N 2/15/99 4 - 8 ft bgs	116DP-0402N 2/15/99 8 - 12 ft bgs

Note: Sample IDs 116DP-0102D and 116DP-0202D are field duplicates

Key:

bgs	=	Below ground surface
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.27-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil

UST 8-116

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
Acenaphthene	18000 00	0 81
Anthracene	91000 00	0 17
Benzo(a)anthracene	31 00	0 53
Benzo(a)pyrene	3 10	0 71
Benzo(b)fluoranthene	31 00	1
Benzo(g,h,ı)perylene	9100 00	1 5
Benzo(k)fluoranthene	310 00	0 18
Carbazole	2000	0 094
Chrysene	3100 00	1
Dıbenzofuran	3200	0 089
Fluorene	12000 00	1 2
Fluoranthene	12000 00	0 54
Indeno(1,2,3-c,d)pyrene	31 00	0 65
2-Methylnaphthalene	76000 00	0 39
Naphthalene	22000 00	0 07
Phenanthrene	91000 00	0 91
Pyrene	9100 00	1 3
TPH by M8015D		
PHC C10-C22	20000	1900
PHC as Gasolıne	8000	1300

Table 4.27-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil UST 8-116		
Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Numerous SVOCs were detected in one of the two groundwater samples collected at UST 8-116 and TPH was detected in both samples; concentrations are presented in Table 4.27-3. There were no detected concentrations that exceeded the respective VAP standard.

4.27.4 Data Validation Summary

Ten soil samples, two soil duplicates and two groundwater samples were collected at UST 8-116 and were analyzed for SVOCs and TPH (GRO and DRO).

All soil and groundwater data points are useable. The following provides a summary of data validation results for samples collected at UST 8-116:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values[1]	Blank Contamination[2]
Soil					
SVOCs	768	0	100%	11.6%	0%
TPH (GRO and DRO)	24	0	100%	4.2%	0%
Groundwater					
SVOCs	128	0	100%	3.9%	0%
TPH (GRO and DRO)	4	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.27.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. UST 8-116 is recommended for Category 4 designation.

Table 4.27-3

Summary of Analyte Concentrations for Groundwater Samples
UST 8-116

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	116GW-02N 2/15/99	116GW-04N 2/15/99
Analyte	**Semivolatiles by SW8270 (ug/L)**		
Benzo(a)pyrene	NA	3 J	10 U
Benzo(b)fluoranthene	NA	3 8 J	10 U
Benzo(g,h,i)perylene	NA	10	10 U
bis(2-Ethylhexyl)phthalate	NA	7 2 J	10 U
Chrysene	NA	3 9 J	10 U
Indeno(1,2,3-c,d)pyrene	NA	3 3 J	10 U
Pyrene	NA	3 5 J	10 U
Analyte	**TPH by M8015 (ug/L)**		
PHC as Gasoline	NA	100 U	1500
PHC C10-C22	NA	3400	100 U

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter

4.28 UST 9-91

UST 91 (9-91) was formerly located north of Building 9. The UST was installed in 1954.

4.28.1 Site Summary

UST 9-91 was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 15,000 gallons and was used to store No. 2 fuel oil. Samples from the excavation stockpile contained BTEX, and oil and grease at concentrations that exceeded detection limits (Reference 138). Because of recorded releases, the UST site required further investigation and sampling for fuel oil constituents.

4.28.2 Field Activities Conducted

Five boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Seven direct push soil samples and two groundwater samples were collected at UST 9-91 and were analyzed for SVOCs, GRO and DRO. A sample for vertical conductivity determination was collected. Sample locations are shown in Figure 4.28-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at UST 9-91				
Sampling Point	**Soil(1)**	**Groundwater(2)**	**Soil Gas**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	7	2	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range organics and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), semivolatile organics (SW3550/8270), and vertical conductivity.

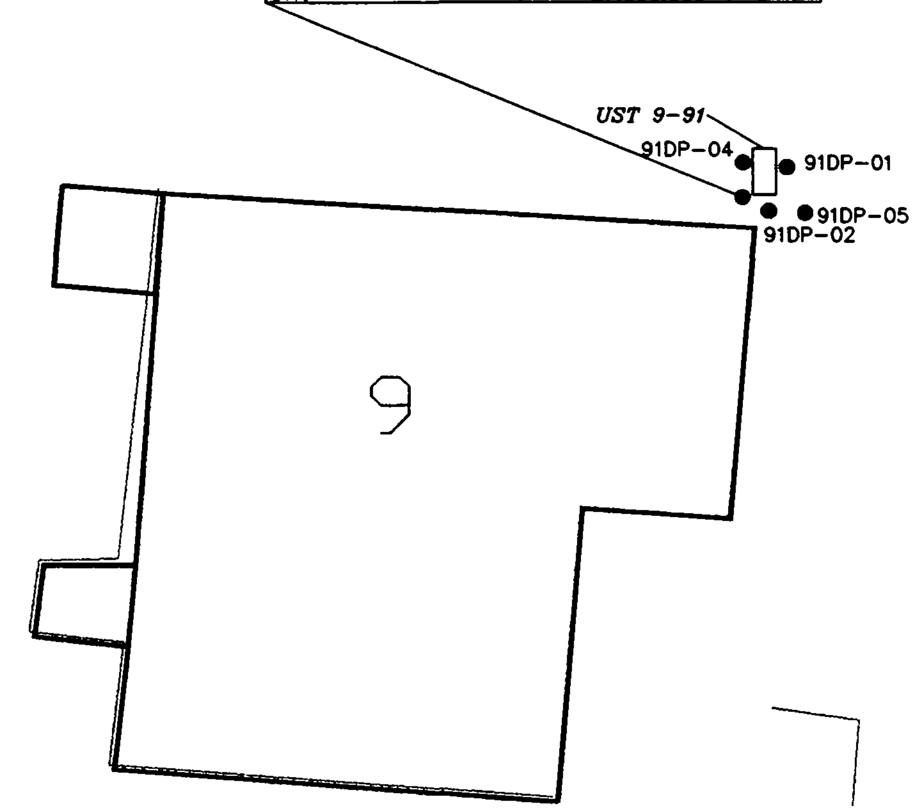
(2) Groundwater analytical suite: Diesel range organics and gasoline range organics (modified SW8015) and semivolatile organics (SW3510/8270).

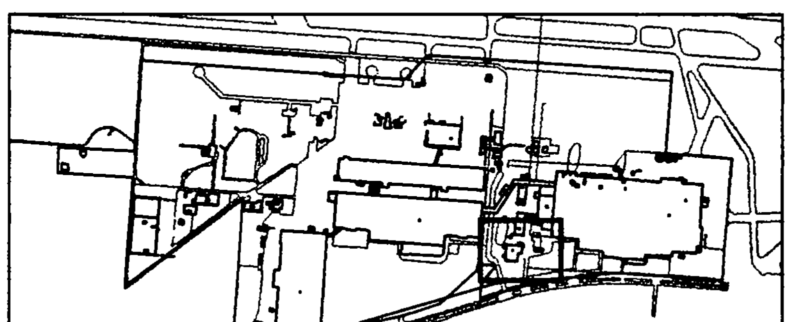
4.28.3 Results

Numerous SVOCs and TPH were detected in soil samples collected at UST 9-91; concentrations are presented in Table 4.28-1. Table 4.28-2 presents a comparison between the maximum site concentration and the VAP-adjusted standard for each analyte. Numerous PAH concentrations exceeded their respective VAP-adjusted standards. These PAHs include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene. Diesel range organics were also detected

91DP-03

Chemicals	Detected Concentration	Depth (ft)
Benzo(a)anthracene	600,000	0-4
Benzo(a)pyrene	520,000	0-4
Benzo(b)fluoranthene	790,000	0-4
Benzo(k)fluoranthene	280,000	0-4
Chrysene	650,000	0-4
Dibenza(a,h)anthracene	92,000	0-4
Indeno(1,2,3-c,d)pyrene	330,000	0-4
DRO	27,000,000	0-4





Area of Interest

Legend

● Direct Push Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.28-1

UST 9-91
Soil Sample Locations
and Analyte
Concentrations (ug/kg)

29179.4.28-31DWO/PLT

Table 4.28-1

Summary of Analyte Concentrations for Soil Samples
UST 9-91

Sample ID Date Sampled Depth	91DP-0101N 2/15/99 4 - 8 ft bgs	91DP-0101D 2/15/99 4 - 8 ft bgs	91DP-0201N 2/15/99 0 - 4 ft bgs	91DP-0301N 2/15/99 0 - 4 ft bgs	91DP-0302N 2/15/99 4 - 8 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
2-Methylnaphthalene	430 U	420 U	880	240000 U	570 U
Acenaphthene	430 U	420 U	410 U	65000 J	210 J
Anthracene	430 U	420 U	410 U	160000 J	410 J
Benzo(a)anthracene	430 U	420 U	110 J	600000	1400
Benzo(a)pyrene	430 U	420 U	93 J	520000	1200
Benzo(b)fluoranthene	430 U	420 U	140 J	790000	1800
Benzo(g,h,i)perylene	430 U	420 U	65 J	290000	800
Benzo(k)fluoranthene	430 U	420 U	410 U	280000	730
Carbazole	430 U	420 U	410 U	160000 J	320 J
Chrysene	430 U	420 U	130 J	650000	1700
Dibenz(a,h)anthracene	430 U	420 U	410 U	92000 J	230 J
Dibenzofuran	430 U	420 U	410 U	24000 J	99 J
Fluoranthene	430 U	420 U	310 J	1600000	3300
Fluorene	430 U	420 U	410 U	56000 J	230 J
Indeno(1,2,3-c,d)pyrene	430 U	420 U	63 J	330000	860
Naphthalene	430 U	420 U	240 J	240000 U	570 U
Phenanthrene	430 U	420 U	210 J	910000	2100
Pyrene	430 U	420 U	220 J	1200000	2600
Analyte	**TPH by M8015D (mg/kg)**				
PHC as Gasoline	0 18	0 21	0 62	0 11 U	0 13 U
PHC C10-C22	13 U	13 U	110	27000	49

Table 4.28-1

Summary of Analyte Concentrations for Soil Samples
UST 9-91

Sample ID Date Sampled Depth	91DP-0401N 2/15/99 4 - 8 ft bgs	91DP-0401D 2/15/99 4 - 8 ft bgs	91DP-0402N 2/15/99 8 - 12 ft bgs	91DP-0501N 2/15/99 0 - 4 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**			
2-Methylnaphthalene	11000 D	7800 D	4800	360 U
Acenaphthene	870 J	570 J	300 J	360 U
Anthracene	400 J	230 J	750 U	360 U
Benzo(a)anthracene	400 U	410 U	750 U	360 U
Benzo(a)pyrene	400 U	410 U	750 U	360 U
Benzo(b)fluoranthene	400 U	410 U	750 U	360 U
Benzo(g,h,i)perylene	400 U	410 U	750 U	360 U
Benzo(k)fluoranthene	400 U	410 U	750 U	360 U
Carbazole	400 U	100 J	750 U	360 U
Chrysene	400 U	410 U	750 U	360 U
Dibenz(a,h)anthracene	400 U	410 U	750 U	360 U
Dibenzofuran	740 J	520 J	300 J	360 U
Fluoranthene	68 J	410 U	750 U	360 U
Fluorene	1600	970 J	580 J	360 U
Indeno(1,2,3-c,d)pyrene	400 U	410 U	750 U	360 U
Naphthalene	3000	2100	1400	360 U
Phenanthrene	3900 J	2400	940	360 U
Pyrene	250 J	110 J	750 U	360 U
Analyte	**TPH by M8015D (mg/kg)**			
PHC as Gasoline	13	0 15	8 3	0 11 U
PHC C10-C22	810	880	570	11 U

Table 4.28-1

Summary of Analyte Concentrations for Soil Samples (Continued)
UST 9-91

Sample ID Date Sampled Depth	91DP-0401N 2/15/99 4 - 8 ft bgs	91DP-0401D 2/15/99 4 - 8 ft bgs	91DP-0402N 2/15/99 8 - 12 ft bgs	91DP-0501N 2/15/99 0 - 4 ft bgs

Note: Sample IDs 91DP-0101D and 91DP-0401D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.28-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil

UST 9-91

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Det.cted Concentration (mg/kg)
Semivolatiles by SW8270		
Acenaphthene	18000 00	65
Anthracene	91000 00	160
Benzo(a)anthracene	3 87500	600
Benzo(a)pyrene	0 38750	520
Benzo(b)fluoranthene	5 27000	790
Benzo(g,h,ı)perylene	9100 00	290
Benzo(k)fluoranthene	38 75000	280
Carbazole	160 00000	160
Chrysene	387 50000	650
Dıbenz(a,h)anthracene	0 38750	92
Dıbenzofuran	3200	24
Fluorene	12000 00	56
Fluoranthene	12000 00	1600
Indeno(1,2,3-c,d)pyrene	3 87500	330
2-Methylnaphthalene	76000 00	11
Naphthalene	22000 00	3
Phenanthrene	91000 00	910
Pyrene	9100.00	1200
TPH by M8015D		
PHC C10-C22	20000	27000

Table 4.28-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil
UST 9-91

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
PHC as Gasoline	8000	13

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard foı Soil is not available for this chemical
mg/kg = Milligrams per kilogram

at elevated concentrations exceeding the VAP standard. This exceedance appears to be limited to the shallow soil samples collected from boring 91DP-03. Figure 4.28-1 shows the location where soil samples were collected, as well as where exceedances of VAP-adjusted standards exist. Five borings were advanced at 125-FBA-3; depths ranged from 7 to 24 feet bgs. The soils encountered varied from yellow brown/brown clayey silt to silty clay, with gravel and sand. Groundwater was reached at 20 feet bgs in two borings. No sample for vertical conductivity determination was collected. However, a value of 7.38×10^{-7} cm/s was reported at nearby UST 9-91.

Numerous SVOCs were detected in groundwater sample 91GW-01; concentrations are presented in Table 4.28-3. There were no detected concentrations that exceeded the respective VAP unrestricted potable use standards. Figure 4.28-2 shows the location where samples were collected.

Soils encountered ranged from an olive sandy clay to a olive gray silty clay mixed with some sand and gravel. A vertical conductivity value of 7.3810^{-7} cm/s was reported for the sample from boring 91DP-04 collected at 4-8 feet bgs. This it typical of glacial till unconsolidated deposits. Based on the observed clay content of soils encountered within the UST 9-91 borings, and the low conductivity, the potential for contaminant leaching to groundwater is limited. Further investigation at this site will be conducted to assess the potential of contaminant migration to groundwater.

4.28.4 Data Validation Summary

Seven soil samples, two soil duplicates and two groundwater samples were collected at UST 9-91 and were analyzed for SVOCs and TPH (GRO and DRO).

All SVOC detects were qualified J for one groundwater samples (91GW-01N) due to SVOC holding time exceedance and all base neutral compounds were qualified R and rejected due to a low percent recovery of surrogate spikes. Detects of 2-methylnaphthalene and phenanthrene for samples 91DP-0401N and 91DP-0401D were qualified R and rejected because the sample results exceeded calibration ranges.

All soil and groundwater data points are useable except for the rejected results described above. The following provides a summary of data validation results for samples collected at UST 9-91:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	576	3	99.5%	11.7%	0%
TPH (GRO and DRO)	18	0	100%	11.1%	0%
Groundwater					
SVOCs	128	29	77.3%	9.3%	0%
TPH (GRO and DRO)	4	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

Table 4.28-3

Summary of Analyte Concentrations for Groundwater Samples
UST 9-91

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	91GW-01N 2/15/99	91GW-05N 2/15/99
Analyte	**Semivolatiles by SW8270 (ug/L)**		
2-Methylnaphthalene	NA	6 4 J	10 U
Acenaphthene	NA	7 J	10 U
Anthracene	NA	7 3 J	10 U
Benzo(a)anthracene	NA	7 J	10 U
Benzo(a)pyrene	NA	6 6 J	10 U
Benzo(b)fluoranthene	NA	8 J	10 U
Benzo(g,h,i)perylene	NA	5 8 J	10 U
bis(2-Ethylhexyl)phthalate	NA	15 J	10 U
Carbazole	NA	4 6 J	10 U
Chrysene	NA	11 J	10 U
Dibenzofuran	NA	3 8 J	10 U
Fluoranthene	NA	18 J	10 U
Indeno(1,2,3-c,d)pyrene	NA	4 9 J	10 U
Naphthalene	NA	4 J	10 U
Phenanthrene	NA	14 J	10 U
Pyrene	NA	29 J	10 U

Table 4.28-3

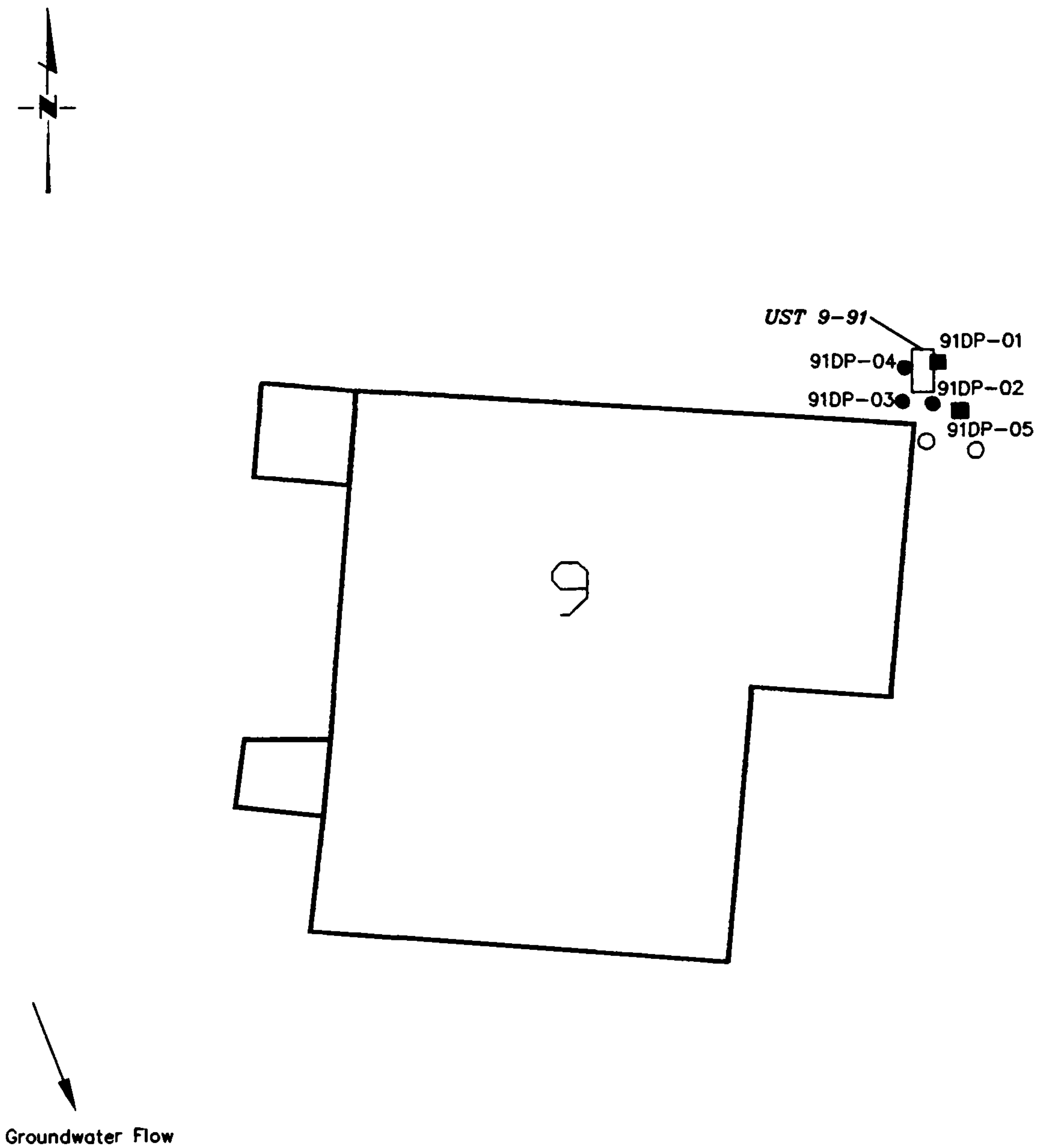
Summary of Analyte Concentrations for Groundwater Samples (Continued)
UST 9-91

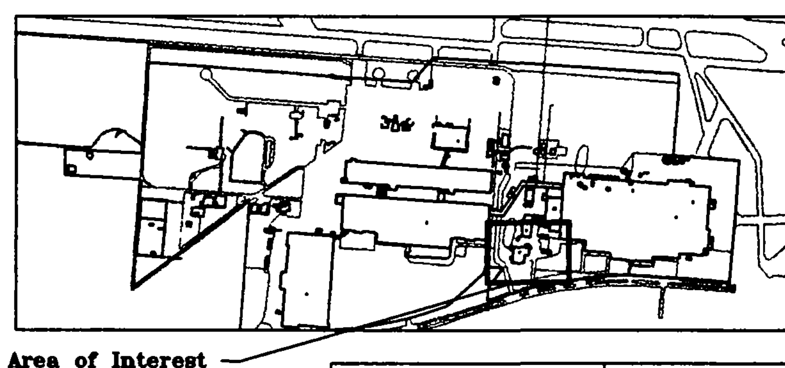
Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	91GW-01N 2/15/99	91GW-05N 2/15/99

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter





EARTH TECH

Figure 4.28-2

UST 9-91
Groundwater Sample Locations

Legend
- ● Direct Push Sample Location
- ■ Groundwater Sample Location
- ○ Proposed Borehole Location

0' 25' 50' 100'
SCALE

4.28.5 Recommendations for Further Action

As discussed in Section 4.28.3, numerous PAHs and DRO were detected at concentrations exceeding the adjusted VAP soil standards.

In accordance with OAC 3745-300-07 (D)(2), complete pathways must be determined for UST 9-91. The potentially complete pathway is exposure to groundwater containing chemicals of concern which have leached from soil. On-site or off-site receptors may be exposed to groundwater in the following ways:

- Ingestion of chemicals of concern if groundwater is used as a drinking water source.
- Dermal contact with chemicals of concern if groundwater is used for bathing/showering or is contacted incidentally during other potable or process use by receptors.
- Inhalation of VOCs released from groundwater if groundwater is used for bathing/showering or inhaled incidentally during other potable or process use by receptors.

To determine whether PAHs in soil are leaching to groundwater, additional sampling is recommended in the vicinity of the elevated PAH hits. Two boreholes are proposed within a 20-foot radius of 91DP-03. The boreholes should be drilled to groundwater. Soil will be sampled every 5 feet and groundwater will be sampled. Samples will be analyzed for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, and DRO only. Proposed borehole locations are shown in Figure 4.28-2. This additional sampling will determine the vertical and horizontal extent of contamination. On the basis of this determination, either a baseline risk assessment or further sampling will be conducted.

UST 9-91 is recommended for Category 7 designation.

4.29 UST 125-FBA-3

UST 125-FBA-3 was formerly located east of Building 125. The UST was installed in 1956.

4.29.1 Site Summary

UST 125-FBA-3 was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 1,000 gallons and was used to store No. 2 fuel oil (Reference 138). Because of recorded releases, the UST site requires further investigation and sampling for fuel oil constituents.

4.29.2 Field Activities Conducted

Five boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Fifteen direct push soil samples and one groundwater sample were collected at UST 125-FBA-3 and analyzed for SVOCs, GRO and DRO. A sample for vertical conductivity determination was collected. Sample locations are shown in Figure 4.29-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at UST 125-FBA-3				
Sampling Point	**Soil(1)**	**Groundwater(2)**	**Soil Gas**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	15	1	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

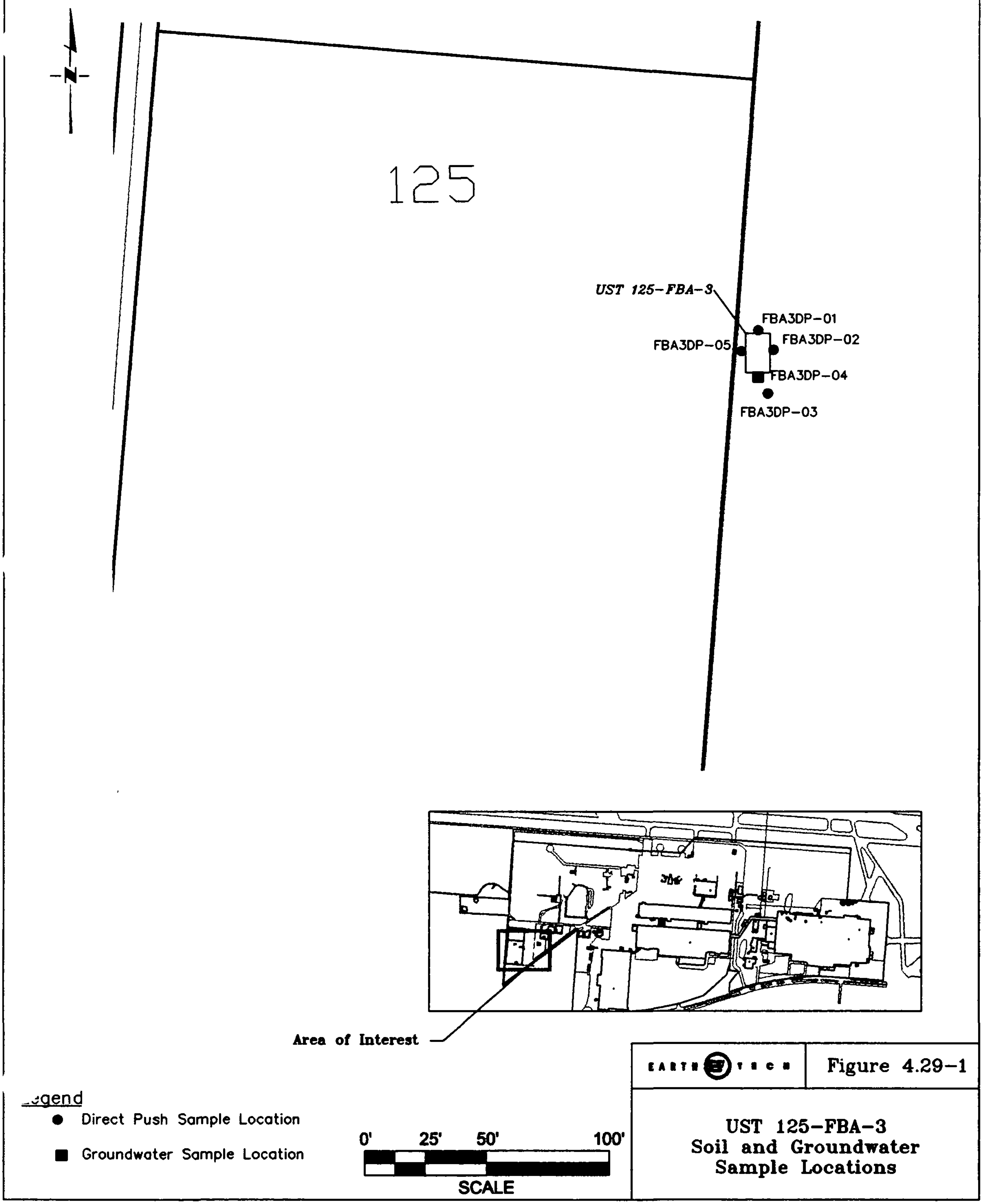
(1) Soil analytical suite: Diesel range and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), SVOCs (SW3550/8270), and vertical conductivity.

(2) Groundwater analytical suite: Diesel range and gasoline range organics (modified SW8015) and SVOCs (SW3510/8270).

4.29.3 Results

DRO was detected in soil samples collected at UST 125-FBA-3; concentrations are presented in Table 4.29-1. Table 4.29-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. DRO concentrations did not exceed the adjusted standard. A vertical conductivity value of 5.35×10^{-8} cm/s collected at 6-8 feet bgs.

Bis(2-ethylhexyl)phthalate was detected in the groundwater sample collected at UST 125-FBA-3; the concentration is presented in Table 4.29-3. The detected concentration did not exceed the respective VAP standard. Figure 4.29-1 shows the location where the sample was collected.



EARTH TECH

Figure 4.29-1

**UST 125-FBA-3
Soil and Groundwater
Sample Locations**

29179.4.26-31DWG/PLT

Table 4.29-1

Summary of Analyte Concentrations for Soil Samples
UST 125-FBA-3

Sample ID Date Sampled Depth	FBA3DP-0101N 2/10/99 4 - 8 ft bgs	FBA3DP-0102N 2/10/99 8 - 12 ft bgs	FBA3DP-0103N 2/10/99 12 - 16 ft bgs	FBA3DP-0104N 2/10/99 16 - 20 ft bgs	FBA3DP-0201N 2/10/99 4 - 7 ft bgs	FBA3DP-0201D 2/10/99 4 - 7 ft bgs
Analyte	**TPH by M8015D (mg/kg)**					
PHC C10-C22	12 U	11 U	11 U	18	11 U	12 U

Table 4.29-1

Summary of Analyte Concentrations for Soil Samples
UST 125-FBA-3

Sample ID Date Sampled Depth	FBA3DP-0301N 2/10/99 4 - 8 ft bgs	FBA3DP-0302N 2/10/99 8 - 12 ft bgs	FBA3DP-0303N 2/10/99 16 - 20 ft bgs	FBA3DP-0401N 2/10/99 4 - 8 ft bgs	FBA3DP-0402N 2/10/99 8 - 12 ft bgs	FBA3DP-0402D 2/10/99 8 - 12 ft bgs
Analyte	**TPH by M8015D (mg/kg)**					
PHC C10-C22	13 U	13	36	12 U	12 U	11 U

Table 4.29-1

Summary of Analyte Concentrations for Soil Samples
UST 125-FBA-3

Sample ID Date Sampled Depth	FBA3DP-0403N 2/10/99 12 - 16 ft bgs	FBA3DP-0404N 2/10/99 16 - 20 ft bgs	FBA3DP-0501N 2/10/99 4 - 8 ft bgs	FBA3DP-0502N 2/10/99 8 - 12 ft bgs	FBA3DP-0502D 2/10/99 8 - 12 ft bgs	FBA3DP-0503N 2/10/99 12 - 18 ft bgs
Analyte	**TPH by M8015D (mg/kg)**					
PHC C10-C22	12	23	12 U	14	12 U	36

Note: Sample IDs FBA3DP-0201D, FBA3DP-0402D and FBA3DP-0502D are field duplicates

Key:

bgs = Below ground surface
mg/kg = Milligrams per kilogram
U = Not detected

Table 4.29-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil UST 125-FBA-3		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**
TPH by M8015D		
PHC C10-C22	20000	36

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Table 4.29-3

Summary of Analyte Concentrations for Groundwater Samples UST 125-FBA-3		
Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	FBA3GW-03N 2/11/99
Analyte	**Semivolatiles by SW8270 (ug/L)**	
bis(2-Ethylhexyl)phthalate	NA	5 J

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter

4.29.4 Data Validation Summary

Fifteen soil samples, three soil duplicates and one groundwater sample were collected at UST 125-FBA-3 and were analyzed for SVOCs and TPH (GRO and DRO).

All SVOC detects were qualified J for the groundwater sample (FBA3GW-03N) due to SVOC holding time exceedance.

All soil and groundwater data points are useable. The following provides a summary of data validation results for samples collected at UST 125-FBA-3:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	1152	0	100%	0.5%	0%
TPH (GRO and DRO)	36	0	100%	5.6%	0%
Groundwater					
SVOCs	64	0	100%	18.8%	0%
TPH (GRO and DRO)	1	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.29.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. 125-FBA-3 is recommended for Category 4 designation.

4.30 UST 270-289

UST 270-289 was formerly located northeast of Building 270. The UST was installed in 1955.

4.30.1 Site Summary

UST 270-289 was removed before December 22, 1988, which was the effective date of final federal Subtitle I regulations. Constructed of steel, the tank had a capacity of 3,300 gallons and was used to store No. 2 fuel oil. Samples from the excavation stockpile contained benzene at concentrations that exceeded the detection limit (Reference 138). Because of recorded releases, the UST site required further investigation and sampling for fuel oil constituents.

4.30.2 Field Activities Conducted

Five boreholes were advanced at this location. Each borehole was continuously sampled every five feet until groundwater or refusal. Eight direct push soil samples and three groundwater samples were collected at UST 270-289 and analyzed for SVOCs, GRO and DRO. Sample locations are shown in Figure 4.30-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

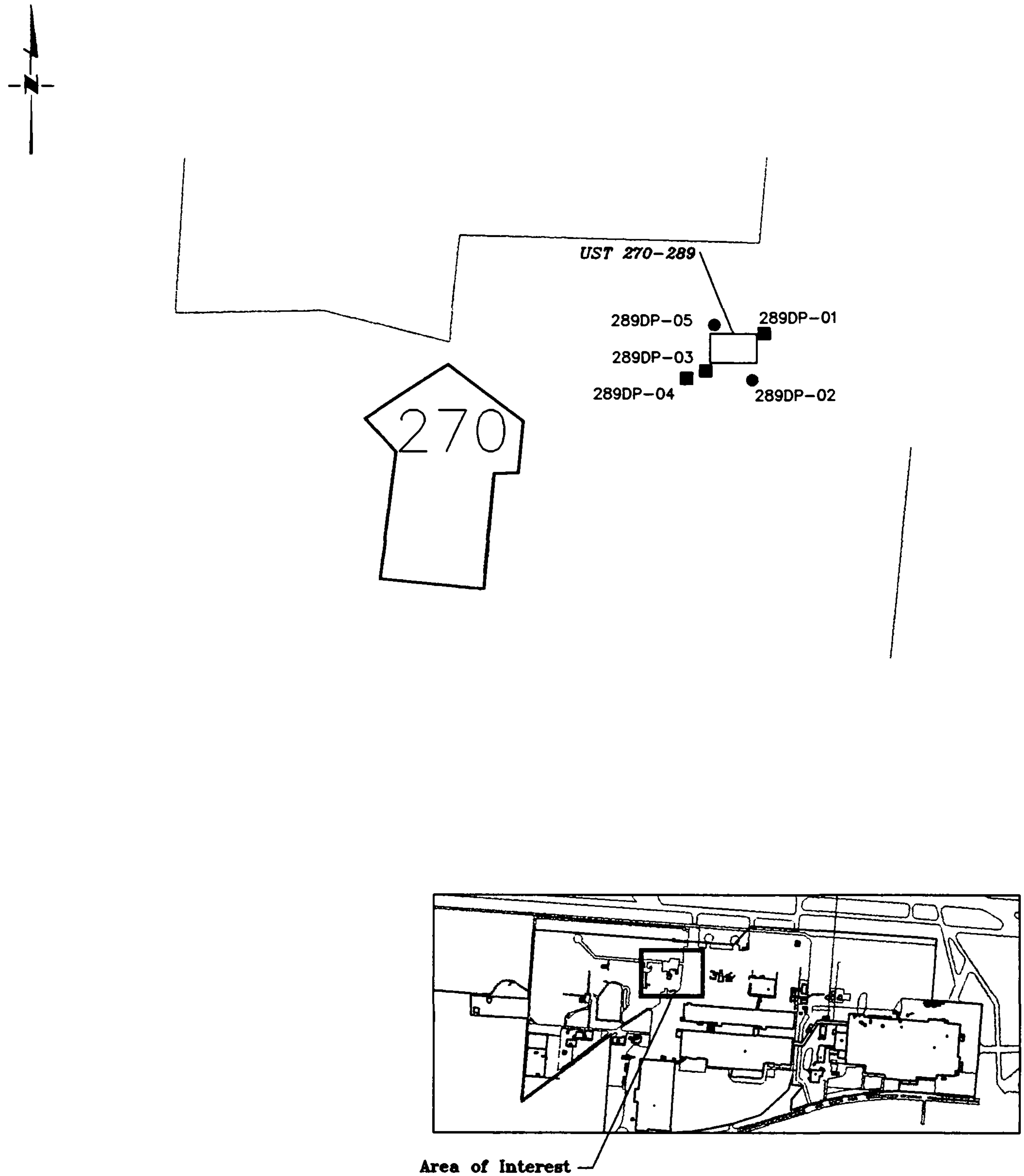
Number of Samples Collected at UST 270-289				
Sampling Point	**Soil(1)**	**Groundwater(2)**	**Soil Gas**	**Other**
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	8	3	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

(1) Soil analytical suite: Diesel range and gasoline range organics (modified SW8015), soil moisture (ASTM D2216), SVOCs (SW3550/8270), and vertical conductivity.

(2) Groundwater analytical suite: Diesel range and gasoline range organics (modified SW8015) and SVOCs (SW3510/8270).

4.30.3 Results

TPH and numerous SVOCs were detected in the soil samples collected at UST 270-289; concentrations are presented in Table 4.30-1. Table 4.30-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards. Five boreholes were advanced at UST 270-289; depths ranged from 7 to 12 feet bgs. The soils encountered varied from yellow brown to orange brown silty clay with little gravel and trace sand. Groundwater was encountered between 5 and 10 feet bgs. No sample for vertical conductivity determination was collected. However, a value of 8.9×10^{-8} cm/s was reported at nearby Jet Engine Test Cell 270 and a value of 4.32×10^{-8} cm/s was reported at UST 7-290.



Legend
- ● Direct Push Sample Location
- ■ Groundwater Sample Location

0' 25' 50' 100'
SCALE

EARTH TECH

Figure 4.30-1

UST 270-289
Soil and Groundwater
Sample Locations

Table 4.30-1

Summary of Analyte Concentrations for Soil Samples
UST 270-289

Sample ID Date Sampled Depth	289DP-0101N 2/17/99 0 - 4 ft bgs	289DP-0201N 2/17/99 0 - 4 ft bgs	289DP-0201D 2/17/99 0 - 4 ft bgs	289DP-0202N 2/17/99 4 - 6 ft bgs	289DP-0301N 2/17/99 0 - 4 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
2-Methylnaphthalene	210 U	190 U	200 U	190 U	53 J
Acenaphthene	80 J	190 U	200 U	190 U	330
Anthracene	200 J	190 U	200 U	190 U	480
Benzo(a)anthracene	770	53 J	110 J	140 J	1000
Benzo(a)pyrene	720	42 J	100 J	130 J	870
Benzo(b)fluoranthene	670	190 U	87 J	110 J	730
Benzo(g,h,i)perylene	380	190 U	200 U	72 J	600
Benzo(k)fluoranthene	560	190 U	88 J	110 J	650
Chrysene	1100	52 J	170 J	220	1500
Dibenz(a,h)anthracene	120 J	190 U	200 U	190 U	190 U
Dibenzofuran	210 U	190 U	200 U	190 U	140 J
Fluoranthene	1600	120 J	220	320	2900
Fluorene	70 J	190 U	200 U	190 U	250
Indeno(1,2,3-c,d)pyrene	210 U	190 U	56 J	69 J	530
Naphthalene	210 U	190 U	200 U	190 U	150 J
Phenanthrene	790	77 J	100 J	140 J	2000
Pyrene	1500	90 J	190 J	270	2100
Analyte	**TPH by M8015D (ug/kg)**				
PHC as Gasoline	130 U	120 U	120 U	110 U	110 U
PHC C16-C32	170000	13000	21000	14000	33000

Table 4.30-1

Summary of Analyte Concentrations for Soil Samples
UST 270-289

Sample ID Date Sampled Depth	289DP-0302N 2/17/99 4 - 8 ft bgs	289DP-0401N 2/18/99 4 - 8 ft bgs	289DP-0501N 2/18/99 4 - 8 ft bgs	289DP-0501D 2/18/99 4 - 8 ft bgs	289DP-0502N 2/18/99 8 - 9 ft bgs
Analyte	**Semivolatiles by SW8270 (ug/kg)**				
2-Methylnaphthalene	210 U	200 U	200 U	190 U	200 U
Acenaphthene	210 U	200 U	200 U	190 U	110 J
Anthracene	210 U	200 U	200 U	190 U	210
Benzo(a)anthracene	68 J	55 J	62 J	110 J	420
Benzo(a)pyrene	54 J	44 J	58 J	100 J	380
Benzo(b)fluoranthene	210 U	200 U	52 J	95 J	320
Benzo(g,h,i)perylene	210 U	200 U	200 U	190 U	200 U
Benzo(k)fluoranthene	49 J	40 J	52 J	100 J	320
Chrysene	100 J	86 J	100 J	180 J	630
Dibenz(a,h)anthracene	210 U	200 U	200 U	190 U	200 U
Dibenzofuran	210 U	200 U	200 U	190 U	58 J
Fluoranthene	160 J	130 J	140 J	240	990
Fluorene	210 U	200 U	200 U	190 U	100 J
Indeno(1,2,3-c,d)pyrene	210 U	200 U	200 U	190 U	200 U
Naphthalene	210 U	200 U	200 U	190 U	200 U
Phenanthrene	120 J	110 J	75 J	150 J	790
Pyrene	150 J	110 J	130 J	240	880
Analyte	**TPH by M8015D (ug/kg)**				
PHC as Gasoline	26 J	120 U	120 U	120 U	120 U
PHC C16-C32	5100 U	42000	75000	37000	25000

Table 4.30-1

Summary of Analyte Concentrations for Soil Samples (Continued)
UST 270-289

Sample ID Date Sampled Depth	289DP-0302N 2/17/99 4 - 8 ft bgs	289DP-0401N 2/18/99 4 - 8 ft bgs	289DP-0501N 2/18/99 4 - 8 ft bgs	289DP-0501D 2/18/99 4 - 8 ft bgs	289DP-0502N 2/18/99 8 - 9 ft bgs

Note: Sample IDs 289DP-0201D and 289DP-0501D are field duplicates

Key:

B	=	Present in associated method blank
bgs	=	Below ground surface
D	=	The analyte was quantified at a secondary dilution factor
J	=	Estimated
mg/kg	=	Milligrams per kilogram
S	=	Analyzed by method of standard addition
U	=	Not detected
ug/kg	=	Micrograms per kilogram

Table 4.30-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil

UST 270-289

Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Semivolatiles by SW8270		
Acenaphthene	18000 00	0 33
Anthracene	91000 00	0 48
Benzo(a)anthracene	31 00	1
Benzo(a)pyrene	3 10	0 87
Benzo(b)fluoranthene	31 00	0 73
Benzo(g,h,ı)perylene	9100 00	0 6
Benzo(k)fluoranthene	310 00	0 65
Chrysene	3100 00	1 5
Dıbenz(a,h)anthracene	3 10	0 12
Dıbenzofuran	3200	0 14
Fluorene	12000 00	0 25
Fluoranthene	12000 00	2 9
Indeno(1,2,3-c,d)pyrene	31 00	0 53
2-Methylnaphthalene	76000 00	0 053
Naphthalene	22000 00	0 15
Phenanthrene	91000.00	2
Pyrene	9100 00	2 1
TPH by M8015D		
PHC C16-C32	40000	170
PHC as Gasolıne	8000	0 026

Table 4.30-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil UST 270-289		
Analyte	**Adjusted VAP Standard for Soil (mg/kg)**	**Maximum Detected Concentration (mg/kg)**

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

Numerous SVOCs and DRO were detected in one of the three groundwater samples collected at UST 270-289; concentrations are presented in Table 4.30-3. No detected concentrations exceeded the respective VAP standards.

4.30.4 Data Validation Summary

Eight soil samples, two soil duplicates and three groundwater samples were collected at UST 270-289 and were analyzed for SVOCs and TPH (GRO and DRO).

Sixty percent of the TPH (GRO and DRO) data points for soil samples were estimated due to low percent recovery of matrix and surrogate spikes.

All soil and groundwater data points are useable. The following provides a summary of data validation results for samples collected at UST 270-289:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
SVOCs	660	0	100%	25%	0%
TPH (GRO and DRO)	20	0	100%	60%	0%
Groundwater					
SVOCs	198	0	100%	5.1%	0%
TPH (GRO and DRO)	6	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.
(2) The percentage of blank contamination includes both field and laboratory blanks.

4.30.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. UST 270-289 is recommended for Category 4 designation.

Table 4.30-3

Summary of Analyte Concentrations for Groundwater Samples
UST 270-289

Sample ID Date Sampled	VAP Generic Unrestricted Potable Use Standard	289GW-01N 2/17/99	289GW-03N 2/17/99	289GW-04N 2/18/99
Analyte	**Semivolatiles by SW8270 (ug/L)**			
bis(2-Ethylhexyl)phthalate	NA	42	10 U	10 U
Chrysene	NA	2 7 J	10 U	10 U
Fluoranthene	NA	3 2 J	10 U	10 U
Phenanthrene	NA	1 5 J	10 U	10 U
Pyrene	NA	3 J	10 U	10 U
Analyte	**TPH by M8015 (ug/L)**			
PHC C16-C32	NA	550 J	650 U	600 U

Note: Shaded cells indicate that the chemical was quantified at a concentration that exceeds the VAP Generic Unrestricted Potable Use Standard

Key:

J	=	Estimated
NA	=	Not available
U	=	Not detected
ug/L	=	Micrograms per Liter

4.31 USED BATTERY STORAGE AREA (9-BATST)

The former used battery storage area was located outside on a concrete surface on the northwest side of Building 9 and southeast of the Coal Pile Leachate Site (IRP Site 2). It was approximately 20 feet by 30 feet and bound on three sides by a concrete lined collection trench. The trench was 6 inches deep and 6 inches wide.

4.31.1 Site Summary

From before 1980 to at least 1989, undrained used batteries were stored at this location prior to disposal. The batteries contained lead-contaminated acid (D008, D002). Because of the RFA recommendation to sample, the soil in this area should be sampled for lead. Used battery storage (9-BATST) was designated as Category 7 in the EBS (Reference 213).

4.31.2 Field Activities Conducted

The Phase II SOW called for 8 hand auger samples to be collected at this site. However, due to an abundance of pea gravel, modifications were made and eight direct push boreholes were advanced at this location. Each borehole was sampled at two feet. A total of eight soil samples were collected and analyzed for lead. Sample locations are shown in Figure 4.31-1. The following chart presents the number of samples collected from this site, as well as the analyses performed.

Number of Samples Collected at 9-BATST				
Sampling Point	Soil(1)	Groundwater	Soil Gas	Other
Existing Wells	--	--	--	--
New Wells	--	--	--	--
Borehole	--	--	--	--
Direct Push Hole	8	--	--	--
Hand Auger to 6-inch	--	--	--	--
Soil Gas Survey	--	--	--	--
Grab Samples	--	--	--	-
Wipe Samples	--	--	--	--

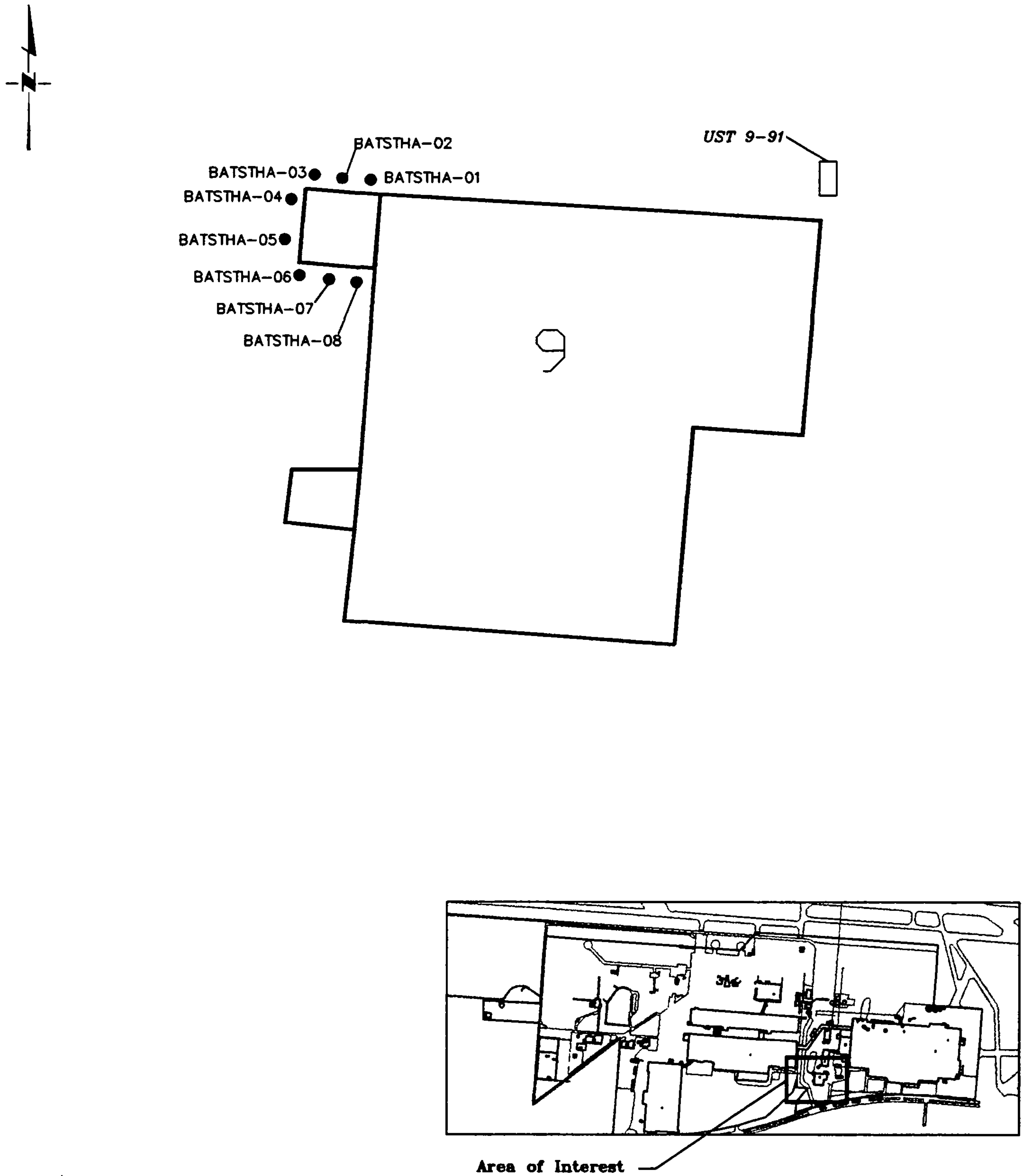
(1) Soil Analytical suite: Lead (SW3050/SW7421), and soil moisture (ASTM D2216).

4.31.3 Results

Lead was detected in all soil samples collected at 9-BATST; concentrations are presented in Table 4.31-1. Table 4.31-2 presents a comparison between the maximum site concentrations and the adjusted VAP standards. No analyte concentrations exceeded the adjusted standards.

4.31.4 Data Validation Summary

Eight soil samples and one soil duplicate were collected at 9-BATST and were analyzed for lead.



Legend

● Direct Push Sample Location

0' 25' 50' 100'

SCALE

EARTH TECH

Figure 4.31-1

Used Battery Storage Area (9-BATST) Soil Sample Locations

29179.4.20-31DWG/PLT

Table 4.31-1

Summary of Analyte Concentrations for Soil Samples
Used Battery Storage Area (9-BATST)

Sample ID Date Sampled Depth	BATSTHA-01N 2/24/99 0 - 2 ft bgs	BATSTHA-02N 2/24/99 0 - 2 ft bgs	BATSTHA-03N 2/24/99 0 - 2 ft bgs	BATSTHA-04N 2/24/99 0 - 2 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**			
Lead	8 9	15	16	13

Table 4.31-1

Summary of Analyte Concentrations for Soil Samples
Used Battery Storage Area (9-BATST)

Sample ID Date Sampled Depth	BATSTHA-05N 2/24/99 0 - 2 ft bgs	BATSTHA-05D 2/24/99 0 - 2 ft bgs	BATSTHA-06N 2/24/99 0 - 2 ft bgs	BATSTHA-07N 2/24/99 0 - 2 ft bgs	BATSTHA-08N 2/24/99 0 - 2 ft bgs
Analyte	**Inorganics by SW6010 (mg/kg)**				
Lead	17	13	17	18	14

Note: Sample ID BATSTHA-05D is a field duplicate

Key:
bgs = Below ground surface
mg/kg = Milligrams per kilogram

Table 4.31-2

Comparison of Maximum Site Concentrations to Site-Adjusted VAP Standards for Soil Used Battery Storage Area (9-BATST)		
Analyte	Adjusted VAP Standard for Soil (mg/kg)	Maximum Detected Concentration (mg/kg)
Inorganics by SW6010		
Lead	2800	18

Note: Shaded cells indicate that the maximum concentration detected for the chemical at this site exceeds the Site-Adjusted VAP Standard for Soil

Key: NA = Not applicable A VAP Standard for Soil is not available for this chemical
mg/kg = Milligrams per kilogram

All soil data points are useable. The following provides a summary of data validation results for samples collected at 9-BATST:

Analysis	Total Number of Data Points	Number of Rejected Data Points	Completeness	Estimated Values(1)	Blank Contamination(2)
Soil					
Lead	9	0	100%	0%	0%

(1) The percentage of estimated values includes estimated non-detect and detected data points.

(2) The percentage of blank contamination includes both field and laboratory blanks.

4.31.5 Recommendations for Further Action

Based on field observations and analytical results indicating no elevated concentrations of analytes exist, no further action is recommended. Used Battery Storage Area (9-BATST) is recommended for Category 4 designation.

5.0 WASTE CHARACTERIZATION

The following section describes the procedures for handling and disposing of waste generated on-site during the Phase II-Winter 99 field investigation. These wastes included soil cuttings, monitoring well development/purge water, and equipment decontamination fluids.

5.1 SOIL CUTTINGS

Soil cuttings were containerized in 55-gallon drums and transported to a temporary staging area in Building 124 designated by on-site personnel. Six composite soil samples were collected from the drums by Earth Tech and analyzed by the laboratory for TCLP parameters VOCs, SVOCs, pesticides, and metals. The samples were collected by compositing grab samples from individual drums containing like materials from similar locations. Table 5.1-1 presents the AFP85 drum number, its contents, and the corresponding waste characterization samples, as well as each drum's final classification. Based on the analytical results for the composite soil samples, all 15 drums of soil cuttings generated as part of the field investigation were characterized as non-hazardous. All soil cuttings were disposed of in accordance with applicable State and Federal regulations by Clean Harbors Environmental Services at their Braintree, Massachusetts facility. Waste manifests are provided in Appendix L.

5.2 MONITORING WELL DEVELOPMENT/PURGE WATER

Development/purge water was containerized in 55-gallon drums and transported to the same staging location in Building 124 as the drill cuttings. Five composite water samples were collected from drums containing well development or purge water, and were analyzed by the laboratory for TCLP parameters. As shown in Table 5.1-1, all 8 drums were characterized as non-hazardous.

5.3 EQUIPMENT DECONTAMINATION FLUIDS

All fluids generated during equipment decontamination were contained within the temporary decontamination pad. The fluids were periodically pumped from the decontamination pad into labeled 55-gallon drums and transported to the temporary staging area in Building 124. Based on the analytical results for the water sample collected by Earth Tech, all 3 drums of decontamination fluids generated as part of the field investigation were characterized as non-hazardous. All of the decontamination fluids were disposed of in accordance with applicable State and Federal regulations by Clean Harbors Environmental Services at their Braintree, Massachusetts facility. Waste manifests are provided in Appendix L.

5.4 FIELD ACTIVITY WASTES

During the Phase II-Winter 99 field investigation, grout was used to abandon boreholes drilled in the background sample locations. Leftover grout was containerized in one drum, and was classified non-hazardous. Also during the Phase II-Winter 99 field investigation, plastic sheeting was used to line temporary pad used for decontaminating drilling equipment. This sheeting was placed in a drum, and classified as non-hazardous.

Table 5.1-1
Waste Characterization Samples Corresponding to Investigation-Derived Waste

Drum Number	Contents	Waste Characterization Sample	Classification
AFP85-24	Soil Cuttings: sites 93, 95, SSEWER, PSEWER, 282, 102, 105, 289, 270, 13	IDWDPCUT-01S	Non-Hazardous Soils
AFP85-25	Soil Cuttings: sites 290, 116, 115, 91, 279, SALT, HTA, 125	IDWDPCUT-02S	Non-Hazardous Soils
AFP85-26	Soil Cuttings: sites PSEWER, SSEWER, IRP 1, SPTANK, 271	IDWDPCUT-03S	Non-Hazardous Soils
AFP85-27			Non-Hazardous Soils
AFP85-13	Soil Cuttings: site IRP 201	IDWIRP201-01S	Non-Hazardous Soils
AFP85-14			Non-Hazardous Soils
AFP85-15			Non-Hazardous Soils
AFP85-17	Soil Cuttings: site IRP 101	IDWIRP101-01S	Non-Hazardous Soils
AFP85-18			Non-Hazardous Soils
AFP85-04	Soil Cuttings: site IRP 202	IDWIRP202-01S	Non-Hazardous Soils
AFP85-05			Non-Hazardous Soils
AFP85-06			Non-Hazardous Soils
AFP85-07			Non-Hazardous Soils
AFP85-08			Non-Hazardous Soils
AFP85-09			Non-Hazardous Soils
AFP85-19	IRP101 development water	IDWIRP101-01W	Non-Hazardous Water
AFP85-20			Non-Hazardous Water
AFP85-16	IRP201 development water	IDWIRP201-01W	Non-Hazardous Water
AFP85-10	IRP202 development water	IDWIRP202-01W	Non-Hazardous Water
AFP85-11			Non-Hazardous Water
AFP85-12			Non-Hazardous Water
AFP85-03	Decon Pad Plastic/PPE	None	Non-Hazardous
AFP85-01	Decon water	IDWDECON-01W	Non-Hazardous Water
AFP85-02			Non-Hazardous Water
AFP85-23			Non-Hazardous Water
AFP85-21	IRP 1 Well Purge Water	IRP1PUR-01W	Non-Hazardous Water
AFP85-22	IRP 2 Well Purge Water	IRP2PUR-01W	Non-Hazardous Water